Hurricane Watch

FLYING

THE WORLD'S MOST WIDELY READ AVIATION MAGAZINE

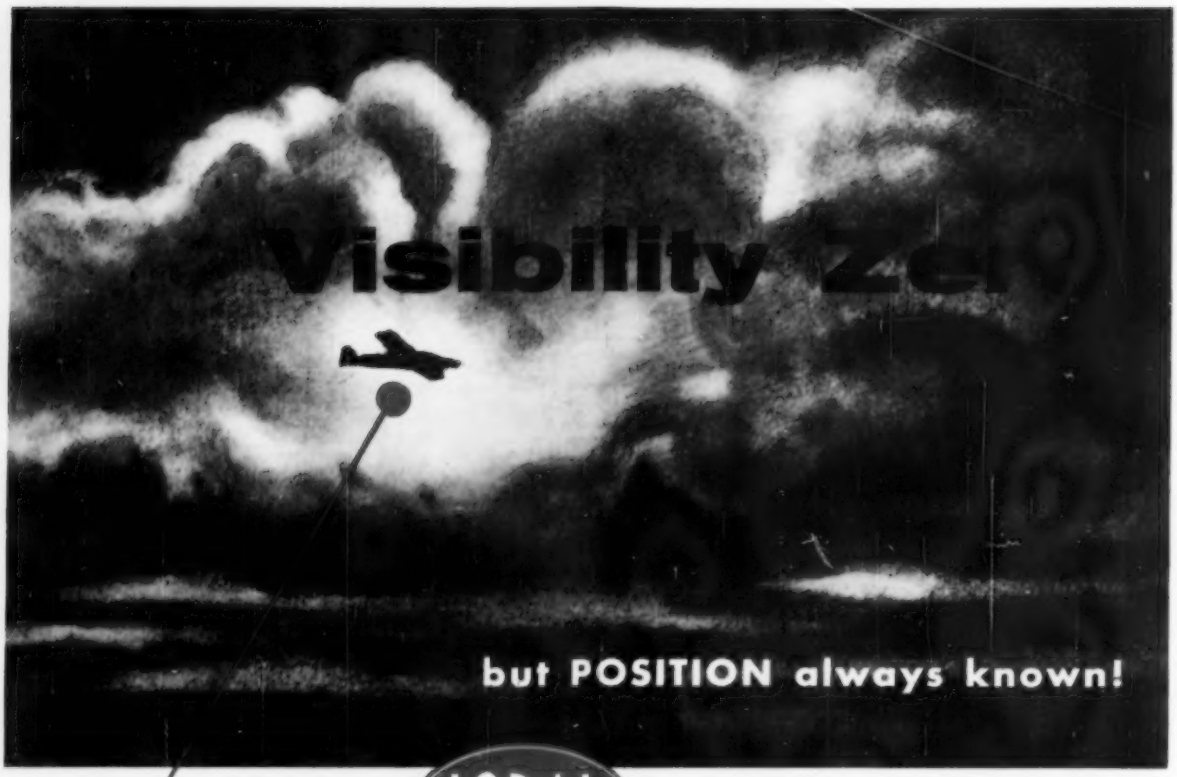
SEPTEMBER, 1955
35 CENTS

African Apache

BY HOWARD PIPER

Check Pilot Report:

THE HELIO COURIER



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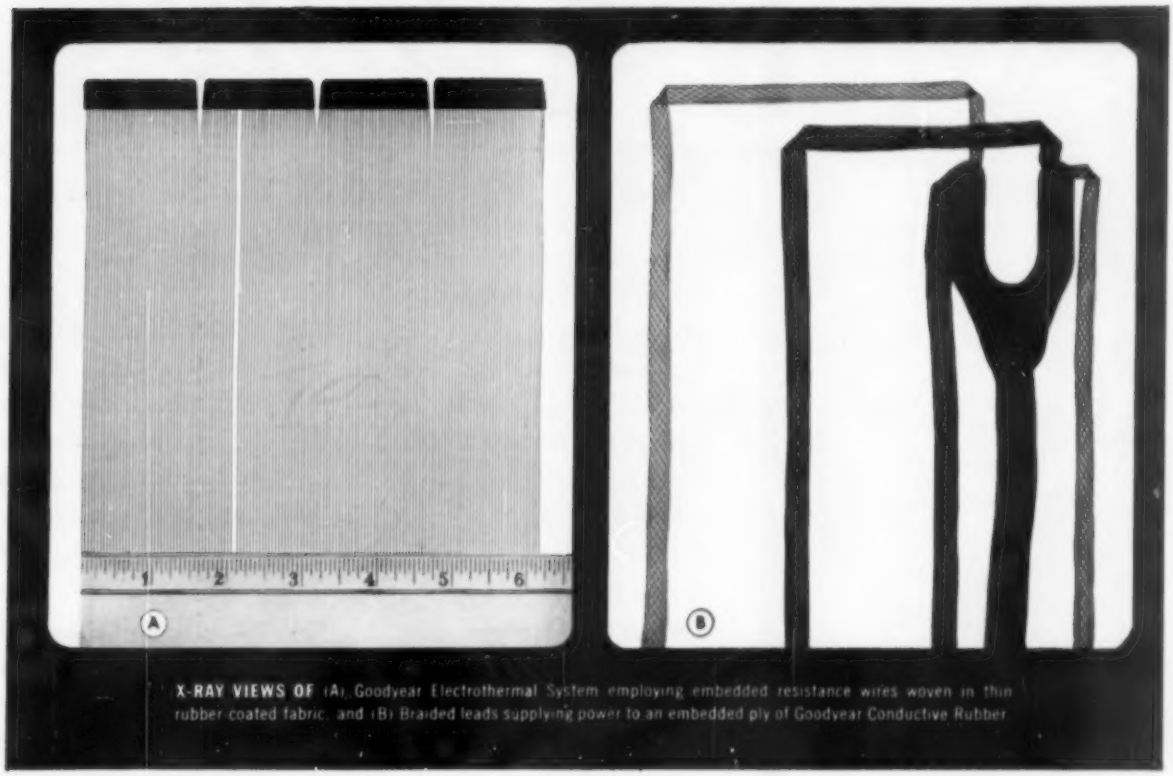

X-RAY VIEWS OF (A) Goodyear Electrothermal System employing embedded resistance wires woven in thin rubber coated fabric, and (B) Braided leads supplying power to an embedded ply of Goodyear Conductive Rubber

Ready to **"put the heat on"** anything

Let Goodyear help you find new ways of using these proved Electrothermal Materials to solve *other* heating problems— *in the air or on the ground!*

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SEPTEMBER, 1955 VOLUME 57, NUMBER 3

FLYING

Reg. U. S. Pat. Off.

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COVER: Republic RF-84F, jet-powered by Curtiss-Wright J65 Sapphire, is serviced by a Consolidated Diesel MA-1 unit.

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ALL OVER AMERICA these days the blast of supersonic flight is shattering the old familiar sounds of city and countryside.

At U.S. Air Force bases strategically located near key cities our Airmen maintain their *round the clock* vigil, ready to take off on a moment's notice in jet aircraft like Convair's F-102A all-weather interceptor. Every flight has only one purpose—your personal protection!

The next time jets thunder overhead, remember that the pilots who fly them are not willful disturbers of your peace; they are patriotic young Americans affirming *your New Sound of Freedom!*

PUBLISHED FOR BETTER UNDERSTANDING OF THE MISSION OF THE U.S.A.F. AIR DEFENSE COMMAND

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION

MAILBOX

MILITARY FLYING CLUBS

In his June Mailbox letter, Capt. James A. Ross has brought up a problem [need for a national organization of military flying clubs] that has plagued me since I started taking flying lessons. I learned to fly while in the Army. All told it took 16 months and a total of 14 hours. That's pretty slow and expensive soloing in my book (and pocketbook). The long hours are due to the fact that I could only fly on week ends, weather permitting. In the course of learning to fly, I changed posts and instructors four times. Each instructor had to review what I had already learned and make whatever changes he thought necessary.

Captain Ross had a good idea and I am one who would like to see something done to get things down where us miserable dogs can reach them. There are four men in my outfit who would learn to fly if the cost were not so high.

PFC. DAVID M. HAYDEN

Camp McCoy, Wis

SOMETIMES WE WONDER . . .

I have read with concern on occasion of the lack of interest or perhaps actual decline of private flying. After a recent experience, I can understand it.

Over a period of years I have owned five different lightplanes. But not since my discharge from the USAF in 1945 have I been an active pilot. However, I recently felt a reawakening of interest in private flying and was delighted to find my wife shared it. I took her to a nearby airport, intent on talking with an instructor, arranging a refresher course and buying a private course for my wife.

After no small searching we found a middle-aged character in dirty surplus GI pants and greasy T-shirt who allowed he was an instructor. His vocabulary was as limited as his wardrobe. Just as I was becoming convinced he didn't have the ability to convey his thoughts adequately to instruct a beginner like my wife, the following happened:

1. One of his ex-students pulled up in a semi-stall after a sizzling take-off run. The "instructor" saw my raised eyebrows and tsk-tsked that the student was "one of these days going to kill himself."

2. Conducted his conversation in the shadow of a wrecked four-place cabin job which was parked immediately in front of the administration building. He gave my wife a detailed description of how the plane cracked up . . . "so hard it threw every bobby pin in the girl's hair out of the plane."

3. Answered my query on what planes were for sale by emphasizing what a great buy I could get in a partially dismantled ship. "All she needs is an engine," he insisted. (The engineless ship was sight enough after the cracked job to convince my wife she wanted no part of this sport.)

4. Concluded that $12 an hour was what he got for dual in a *Cub*.

The sad part of this whole commentary is that we think we're potentially pretty good additions to the ranks of private flying . . . enough time and money. For the last several years we have been driving imported sportscars in the 3 liter class (and that spells $4,000 and up).

As we climbed into our newest one and headed from the airport, I wondered whatever happened to the skilled salesman, the demonstration hop and the other inviting elements which recruited private fliers and owners.

What are we going to do now? Buy a bigger, better sportscar, of course.

NAME WITHHELD

● *Normally, we never carry anonymous letters in the Mailbox section of* FLYING *magazine. However, this letter was signed and we are withholding the writer's name at his request. He says he doesn't want salesmen at his door. We're sorry about that because there are certainly plenty of salesmen and airport operators who could give him a far happier picture of private flying. On the other hand, he has presented an all too familiar scene. We have printed this letter for the good and welfare of the order.*—ED.

TURBO-PROP LEAD

It was my good fortune to attend the flying demonstrations on June 18th at Le Bourget, Paris, during the 21st International Salon. The appearance of the Bristol *Britannia* certainly puts teeth into C. R. Smith's warning in the May issue of FLYING that Britain has the lead. The *Britannia* pilot feathered numbers 3 and 4 on take-off and she climbed beautifully in spite of it. Apparently France, too, has something in its new jet transport the *Caravelle*, which appeared at the show. I think our manufacturers could well accelerate their turbo-prop development, or we might find *Britannias Comets* and *Caravelles* replacing U. S. craft on our own lines in the next few years.

1ST LT. WILLIAM A. RYAN

APO, New York

LOW COST HANGAR

In answer to Mr. Dean Gifford's request to a Flying Farmer for a low cost but substantial hangar, I am sending a picture of a combination machinery shed, corn crib and hangar which I recently designed and built on my 2,400 foot private landing strip. It is of the low cost pole type construction which is becoming popular on Pennsylvania farms.

The corn crib is on both sides of the machinery shed and extends around the

back and ends of the airplane wings. The tail assembly and part of the fuselage extend back into the machinery shed. It is open to the north so direct sunlight does not fall on the plane. When I add doors, they will be hinged at the bottom and counter-balanced so the plane can come right out over them when they are open and on the ground.

This hangar and plane came safely through Hurricane Hazel with winds of 90 mph which destroyed many buildings and planes in this area. By using lumber from my own woodlot and building the hangar in combination with the other farm buildings. I have an investment (not including labor) chargeable to the airplane of about $100 for the roofing material that covers the wing span of the hangar.

MARSHALL L. JONES

Westtown, Pa.

ROYAL OBSERVER CORPS

As a regular reader of FLYING, I have read from time to time of the U. S. Ground Observer Corps. I am an instructor with the Royal Observer Corps in this country, and it occurred to me that maybe some of your American readers are in your GOC. I should very much like to correspond with any reader with this common interest and also would like to arrange a mutual exchange of aircraft flying photographs, say on a one to one basis. . . . I shall be happy to hear from any of your military aircraft enthusiasts, forging another little link of friendship between our two countries.

KEITH E. GIBLEY

19, Chestnut Glen
Hornchurch, Essex,
England

TODAY'S PERFORMANCE
TOMORROW'S PROMISE

For nearly a generation such great fighter planes as REPUBLIC's Thunderbolt and Thunderjet have written their own imperishable records of combat superiority. Today . . . two rugged, powerful members of this warrior clan, the F-84F Thunderstreak and the RF-84F Thunderflash, are on active service adding to the versatility of our U. S. Air Force. ➤ These swept-wing newcomers emphasize the sleek silhouette which has long been the pride mark of Thundercraft. ➤ The potential of the F-103 and F-105 stresses that never in a long, proud history have the touch of engineering genius and production experience been so skillfully combined. ➤ On drawing boards and in the experimental stage are other almost unbelievable new concepts of advance in aeronautical sciences. Whatever military missions tomorrow's Air Force fighter units are called upon to perform . . . you may depend upon Thundercraft to be in the van.

CEILINGS UNLIMITED *for the young ambitious man . . . new vistas of education, travel and security . . . all these are available to career airmen in the USAF. Every day you're in brings you greater satisfaction in the knowledge that yours is a vital and rewarding service to your country . . . to yourself.*

REPUBLIC AVIATION

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Designers and Builders of the Incomparable **THUNDER-CRAFT**

MISSION: TACTICAL AIR MOBILITY. Mobility of men and materiel is a vital problem in the new atomic era. So the Air Force needs a high-speed, low-slung combat cargo plane that can use even short, improvised runways. The new C-130 Hercules with turbo-prop power (Allison T-56 engines) will do this. Now in production at Lockheed's Georgia Division, Marietta, Ga.

A Pentagon Secret

If you were in the vicinity of Alamogordo, Inyokern, Dayton, Muroc Dry Lake or Patuxent River, you would hear new sounds and see strange shapes in the skies. These and other military research centers are constantly testing the new flight forms developed jointly by industry and the military—admirals, generals and thousands of officers and enlisted men.

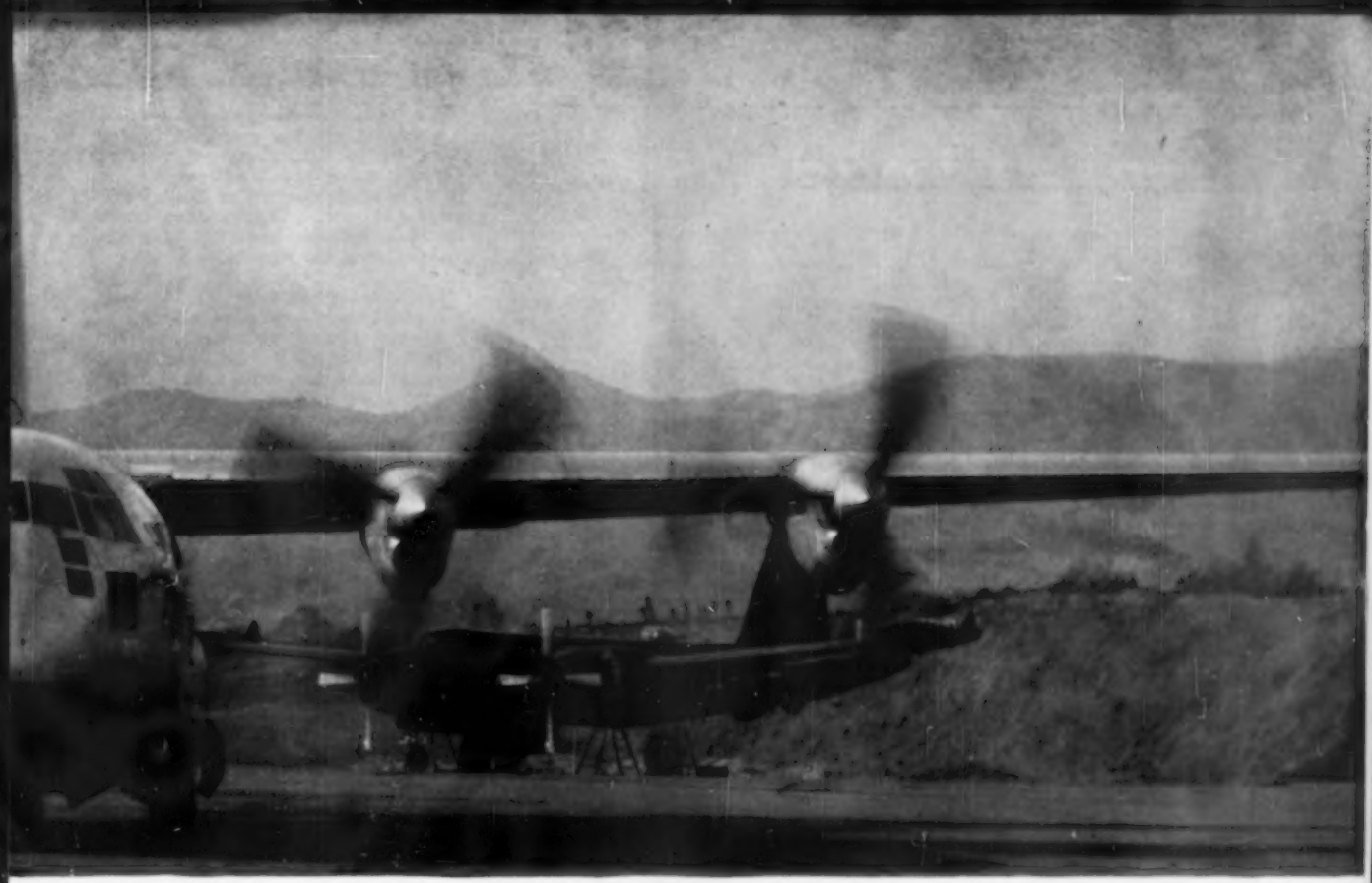
The unique talent of our military executives to mobilize science and industry is the Pentagon secret. In this fast-moving age, our defense needs are ever-changing. This requires new weapons, new aircraft, and whole new concepts of defense. The job of planning and developing these is now the biggest business in the world.

Each new defense device is designed to perform a special and difficult mission. And each originally presented our military executives with a major problem in planning, designing, development and production. Typical of today's defense problems and the machines designed to solve them are the products illustrated on these two pages.

IF YOU'RE A YOUNG MAN, 17 TO 28, INVESTIGATE MILITARY AVIATION AS A CAREER

MISSION: POWER RESEARCH. To prove how even advanced turbo-prop engines could be used on existing air frames designed for piston power, the Navy and Air Force selected Super Constellations (below). Result: these Super Constellations are the world's fastest propeller-driven airplanes, and are now flying for our military. Lockheed is leading the industry in turbo-prop power. Look for the new Lockheed Electra commercial transport with this advanced power. Already ordered in quantity by American Airlines, this advanced airliner promises speeds up to 100 mph faster than commercial transports now in service, and amazing new operating economies for airlines. For travelers throughout the world, the Electra will provide quicker schedules, quieter comfort. Lockheed's vast experience in turbo-prop aircraft will make possible record production schedules.

MISSION: MISSILE SUPREMACY. Ultimate goal of the research and development at Lockheed's Missile Systems Division is a completely reliable, broadly versatile array of guided missiles. Lockheed's MSD has more than 2,000 topflight scientists, physicists, nuclear physicists, engineers and technicians covering virtually every field of science at Van Nuys, Calif., Alamogordo, N. M., and Patrick Air Force Base, Fla.



MISSION: INTERCEPTION. (Right) This condensation trail is a phenomenon caused by great speed at high altitude—symbol of the Air Force's new F-104 Fighter, the Lockheed supersonic interceptor too secret to photograph.

Lockheed

AIRCRAFT CORPORATION

California Division, Burbank, Calif.
Georgia Division, Marietta, Ga.
Missile Systems Division, Van Nuys, Calif.
Lockheed Air Terminal, Burbank
Lockheed Aircraft Service, Burbank

LOOK TO LOCKHEED FOR LEADERSHIP

MISSION: JET TRAINING. Aircraft carrier jet fighters require highly skilled pilots and, to train them, the U. S. Navy needed the world's safest jet trainer. The new T2V-1, the Navy's first carrier jet trainer (shown below), is a product of close Navy-Lockheed cooperation. Flying about 600 mph, it can land under 100. Better visibility and a raised empennage for improved control are other new features.

MISSION: EARLY ENEMY DETECTION. Like climbing a mountain for a better view, the Navy and Air Force "go upstairs" with radar stations on Super Constellations—long-range planes capable of carrying *tons* of 360° radar. Result: more hours of earlier warning. Below, Navy crews at Pearl Harbor pass inspection near their Early Warning Super Constellations.

MISSION: COASTAL PROTECTION. No other nation has so much coastline to protect from submarine or air attack. The Navy and Lockheed have continuously developed Neptune Patrol Bombers (P2V) for this mission. In addition to high speed and long range, this plane (below) typifies Lockheed's leadership in the application of electronics to aircraft.

Briefings . . .

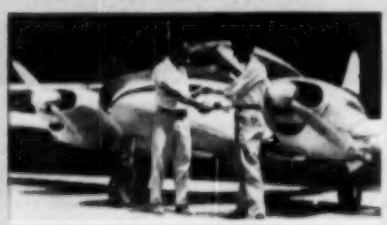
STINSON PARTS, name, engineering data, approved type certificate, tools and jigs have been sold by Piper to Vest Aircraft Co., Denver, Colo. The sale was occasioned by Piper's need for additional space at the Lockhaven plant. Stinson owners are requested to order parts from their Piper dealer or distributor who will be serviced by Vest.

TO BE USED AS VIP TRANSPORTS and based in the Washington, D. C. area, 15 Aero *Commanders* have been ordered by the Air Force. Purchased "off the shelf," the planes will be the standard commercial model now on the production line.

A. W. (TONY) LEVIER, one of aviation's top test pilots and a pioneer of supersonic flight, has been appointed director of flying operations for Lockheed's California Division. LeVier, 42, steps up from the job of chief engineering test pilot. Succeeding him in this work will be Herman R. (Fish) Salmon

FEAR OF PLANE TRAVEL among people with handicapped hearts is usually unfounded, according to Dr. Walter C. Alvarez, consultant emeritus of the Mayo Clinic and editor of "Modern Medicine." "There is an axiom," Dr. Alvarez states, "that he whose heart will let him walk comfortably can fly." Today's pressurized cabins make many of the old fears unjustified, he added.

RANCHER AND BUSINESSMAN Andrew Andreotti of El Centro, Calif., (left) earned his private license in his twin-engine *Apache*, thus having the rare distinction of possessing a private license



which is good only for multi-engine land airplanes. He's shown here receiving the license from CAA flight examiner Jim Vedder. After learning to fly less than a year ago with 8 hours of dual and 4 solo in a *Tri-Pacer*, he started flying the *Apache*.

SWISSAIR'S CARGO department at New York is specializing in a new type of shipment: Cessna and Piper planes. Stowing the planes aboard its DC-4 freighters has been solved by separating them into three units—fuselage, wings and tail assembly; these are then lashed to wooden cradles and hoisted in and out by mobile crane. Major economic factor of such shipping is elimination of crating and warehouse charges.

CAA'S DECISION to permit DME to be used in "straight-in" instrument approaches is responsible for growing interest in the equipment. General Aircraft Supply Corp. of Detroit made installations recently of Narco DME in aircraft owned by The Burroughs Corp., M. A. Hanna Company, Cities Service, Cappel-MacDonald, and the Ohio Oil Co.

KEEPING BIRDS AWAY from runways is a time honored problem in aviation. The British have found a new solution. They report that 300 pounds of mothballs distributed over a runway will keep it clear of birds for months.

MEMBERS OF THE Civil Aeronautics Club, composed of employees of the CAB and CAA, launched a new idea in vacations for government employees by chartering a DC-6 from the Flying Tiger

Line for a mass flight to Europe where they enjoyed a 30-day tour. The club is the first government recreation group to use chartered air transport to provide low-cost trips abroad, the charge being only $260 round trip per person.

A TWO-SEATER light plane, designed specifically for mass-production, France's SIPA 1000, known as the *Coccinelle*, will be in the low price bracket "within the reach of practically everybody." Empty weight is 660 lbs., cruising speed is 106 mph over a range of 375 miles for a fuel consumption equal to 31.5 miles per gallon. The company claims it will be able to use landing strips the size of a football field.

WITH AN ENDURANCE record made in 1935 which still stands today, the famous Curtiss Robin "Ole Miss" made her last flight in July—from Teterboro, N. J., to Washington, D. C., where she will take her rightful place in the Smithsonian Institute. Fred Key, one of the brothers who made the all-time record of 653 hours and 34 minutes, flew the plane to Washington.

A FIVE-FOLD GROWTH in sales in less than three years has prompted Central Aero Supply, subsidiary of Airwork Corp., to move from Woodbury Airport, N. J., to larger quarters at North Philadelphia Airport. Central Aero serves fixed-base operators in a 5-state area with aviation parts and supplies.

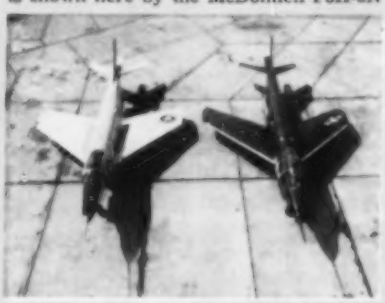
ALL AIRCRAFT OWNERS are advised to install two-way radio in planes not already so equipped. Increased scope and effectiveness of Air Defense Identification Zones indicate that, in the not too distant future, flight without radio communications will necessarily be restricted.

SECTIONAL AND WAC CHARTS are handily carried in this leather case designed especially for them. Called the Flair Case, it is made of top grain cowhide, is also long enough to hold a Mark II plotter or other computers. The back is so designed that it can be used as a writing surface and there is a pencil holder inside the top flap. Size is 14 x 8 x 2 inches, available in suntan or ginger color. Price is $8.95 from Flair, 12931 Dartmouth, Oak Park 37, Mich.

THE PASSENGER death rate for 1954 of .09 deaths per 100 million passenger miles for domestic scheduled operations was the lowest in airline history. There were three fatal accidents, costing the lives of 23 persons—16 passengers and seven crew members. No fatalities resulted from international operations of U. S. flag carriers in 1954.

MONT BLANC, highest mountain in the Alps, surrendered to the Machine Age when a Bell Model 47G-2 commercial helicopter set a 'copter altitude record by landing and taking off from the 15,771-foot summit with two persons aboard.

NAVY'S NEW GRAY AND WHITE atomic age color scheme, replacing dark blue, is shown here by the McDonnell F3H-2N



(left) and the less powerful F3H-1N *Demon* on the right in the old blue.

ROADABLE CORPORATION of America has been formed in Buffalo to develop a roadable aircraft design. Construction on

(Continued on page 12)

FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau

TERRAIN

THE VARIOUS TYPES of terrain surfaces have a significant effect on the air masses flowing over them—with a consequent effect on the weather and plane performance.

One of the most spectacular effects of terrain on air currents is the Mountain Wave—a high-reaching deflection of the winds when a range of hills blocks a strong flow of air. This sets up a "wave" which may reach high altitudes and extend in a chain of waves for several hundred miles downstream. The Lenticular-Type Standing Wave Cloud identifies these large waves. Even small ridges may cause air waves and produce dangerous downdrafts on the lee side (see diagram at right).

Care should be taken in approaching a ridge into the wind, because in a low-powered plane the downdraft may make it impossible to maintain enough altitude to clear the top. Also, when taking off on a runway towards a hill, be prepared for a decreased rate of climb if the wind is coming over the hill.

When flying in the vicinity of mountain tops, the possibility of altimeter error is important. Two primary factors can cause altimeters to indicate *higher altitudes than actual*: Lowered pressures created by disturbed flow on the lee side and abnormally cold temperatures. Combined, they can produce errors in excess of 1000 feet.

Best Pair to Get You There!

Mobiloil AERO

Mobilgas AIRCRAFT

Flying over rough terrain, shifty air currents and sudden downdrafts can call for extra-quick engine response. Here's where insisting on the right fuels and lubricants can pay off.

Mobilgas Aircraft and Mobiloil Aero meet aviation's toughest tests . . . exceed rigid Army and Navy specifications . . . assure you full power and performance when you need it most. *Good reason it pays to fly with the Flying Red Horse!*

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MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

FLY ANYWHERE YOU WISH . . . WITH AMPHIBIOUS FLOATS

Thousands of airports, *millions* of water landing areas are yours with new Edo amphibious floats perfected after 20 years development. Model 289's with smooth handling quadricycle landing gear are installable on any Cessna 180, give you unmatched utility. Edo Model 4580's, modified by de Havilland (Canada), give the Beaver (L-20) similar flexibility.

Standard Edo seaplane floats also readily installed on Piper Tri-Pacer, Super Cub, Cessna 170, and many other types. *This year fly floats!* See your dealer or write for Edo float brochure.

EDO CORPORATION • COLLEGE POINT, L. I., N. Y. FINE FLOATS SINCE 1925

Briefings . . .

(Continued from page 10)

a full-size flight test model has begun. The new firm is headed by Chester R. Haig, Jr., president, and Harry A. Hamilton, Jr., secretary-treasurer, both engineers formerly with Bell Aircraft. The plane will have a wing-span of 27 feet and overall length of over 18 feet. It is expected to fly this year.

BENDIX IS PRODUCING a Polar Path compass which minimizes acute navigation problems in the confused area of the Magnetic North Pole. Heart of the new compass is an extremely precise directional gyro unit that automatically feeds heading information to the plane's automatic pilot.

FROM PARKS COLLEGE of Aeronautical Technology comes the following information: Out of 23 freshmen entering the class which began in April, 10 became interested in aviation because of model building. In other words, nearly 50 per cent of the group developed a lasting interest in aviation through model building.

SMALL ENOUGH to be lifted by one man, the Hughes *Falcon* air-to-air guided missile incorporates a Thiokol solid-propellant motor. Despite its small size, the *Falcon's* built-in "electronic brain" can outwit enemy bombers taking evasive action. The tiny but powerful rocket motor has been a major factor in development of a missile light enough to be launched from an interceptor.

TWO FIBERGLAS TAYLORCRAFT planes have been purchased by Aero Carga and delivered to Asuncion, Paraguay. Ease of maintenance and repair of the fiberglas craft make them particularly attractive to the export market.

CESSNA HAS APPROVED the Speed Control System manufactured by Safe Flight Instrument Corp., as optional factory installed equipment for the Cessna 170, 180 and 310. Using a wing lift measurement principle, the equipment enables the pilot to achieve the best speed for take-off, landing and low speed operations.

TARGET DATE for transfer of some airline schedules from Chicago's Midway Airport to O'Hare Field will be sometime in October. The 17 airlines serving the city are to invest an estimated $1 million in facilities at the airport.

CONTINENTAL MOTORS of Canada, Ltd., has bought a nine-acre tract of land at St. Thomas, Ont., on which it will build an industrial plant to serve its mounting list of Canadian customers. The company, a subsidiary of Continental Motors Corp., 52-year-old pioneer manufacturer of internal combustion engines, received its Ontario provincial charter in 1954.

TO BE BUILT FOR AIRLINE and industrial use, the commercial version of the Piasecki H-21 "Work Horse" helicopter is scheduled for initial delivery in 1956, will

be known as the PH-42. It will be available in a variety of seating arrangements ranging from a deluxe 16-seat version to a standard 19-seat model, as well as passenger-cargo and all-cargo versions.

PAN AMERICAN made its 50,000th crossing of the Atlantic in June. In the 16 years since the first flight, the line has carried 2,021,483 passengers a distance of 20,000,000 miles across the ocean—the equivalent of moving the entire population of Philadelphia 870 times to the moon.

RADAR-PROOF PAINT is said to have been developed by Canadian scientists. The paint is supposed to be able to absorb radar beams and not reflect them back to their source.

PAUL MANTZ HAS BUILT a replica of Charles Lindbergh's famous plane to be used in the motion picture "The Spirit of St. Louis," starring James Stewart. Tom Tutwiler, photographer who did the aerial scenes for "Strategic Air Command," will do the aerial sequences.

TWENTY NATIONAL distributors have placed orders for the Mooney *Mark 20* four-place plane now in production at the company's Kerrville, Tex. plant. Powered by a 150 hp Lycoming, the *Mark 20*

cruises at 165 mph and has a range, fully loaded, of over 950 miles. Stalling speed is 50 mph. Price is $12,500.

A CHARTERED Seaboard and Western Airlines DC-4 made a nonstop photography flight over the North Pole for Mrs. Louise A. Boyd of San Raphael, Calif., from Bodoe in northern Norway. Covering the 2,728 nautical miles in about 16 hours, the plane carried three passengers and eight crew members. In addition to Mrs. Boyd, who was making her eighth

(Continued on page 14)

PLANE FAX

Your Best Week-end Flight Plan for September

For two days of outdoor sports and a military air show, fly in to the Redwood Empire Aviation Days' Celebration at Sonoma County Airport, California, September 24 and 25. You'll get quality Standard Aviation products and service right at the scene of the event.

Flight-testing a column of air

Blueprint for the future — that's the Navy's new Flying Platform, built by Hiller Helicopters under the sponsorship of the Office of Naval Research. "Taking it up is as easy as walking", says Hiller test pilot Phil A. Johnson. "You just lean the way you want to go, and you move, riding on a stream of air. The Platform's proved the principle of control by body-balance, which eliminates all the usual controls we've known in the past except the throttle."

The two small engines used to drive counter-rotating propellers in the Platform are fueled with Chevron Aviation Gasoline 80/87. At Hiller Helicopters' plant near Palo Alto, California, Chevron Aviation Fuels are used to provide safe, dependable power in all of the company's experimental and production aircraft.

Since the early days of aviation, experimenters have depended on Standard Oil Company of California for research help. We produced the first special aviation fuels, the first lightplane fuels with specified take-off ratings, the first non-flammable hydraulic fluids, the first pre-ignition-proof compounded oils. Now, we're making fuels for tomorrow's jets and rockets, and we're supplying Western airports with the best products today's aircraft can use.

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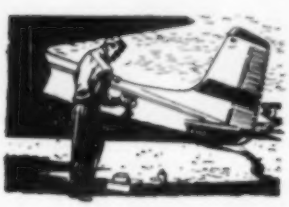

TIP OF THE MONTH

After the dope is thoroughly dry on any fabric patch you may put on, it's wise to protect it immediately with a good covering of paste wax.

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Briefings . . .

(Continued from page 12)

polar expedition, the party included Thor Solberg, who made the first flight from New York to Norway in 1935, and Lt. Gen. Finn Lambrechts of the Norwegian Air Force.

A NEW CONCEPTION in flight instrumentation called NAFLI, meaning Natural Flight Instrument system, has been developed by Lear. First indicator to be released is a 3-in-1 blind-flying instrument that shows in a simple, clear pictorial presentation whether the plane is (1) diving or climbing and at what angle; (2) banking to right or left and the angle and (3) direction plane is heading, indicated on the azimuth scale. In a single 3 inch display, the instrument shows all data previously shown by the 5 inch directional gyro and attitude gyro.

REPUBLIC AVIATION CORP., has announced a contract with the Air Force for development of the RF-105, photo-reconnaissance version of the F-105, an advanced fighter bomber.

SPACE TRAVEL may be some years away, but world civil aviation has flown enough miles of regular air transport in the ten years since the end of World War II to equal 18,000 round trips to the moon —or almost five a day ever since 1945.

STUDENTS OF AIRCRAFT recognition who note the similarity between the nose section of the *Caravelle*, France's first commercial jet transport, and the same forward area of the British *Comet*, are on the right track. De Havilland is understood to be providing the *Comet* nose sections for the *Caravelle*.

NEWLY ELECTED PRESIDENT of the Aviation Writers Association, Vern Haugland of Associated Press (right) is congratulated by The Hon. Ralph O. Campney, Q. C., Minister of National Defense

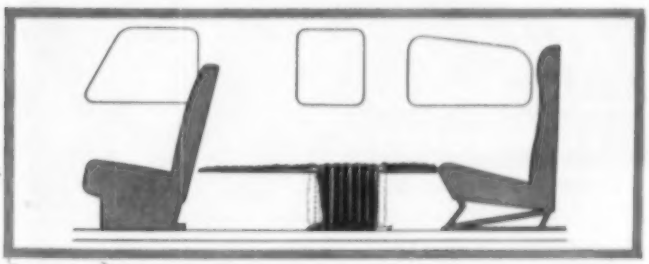
of Canada. Mr. Campney, principal speaker at the AWA convention banquet in Toronto, spoke of the close cooperation between the Canadian and U. S. Air Forces in developing an air defense network for North America.

Twin Bed comfort

in the NEW, BIGGER AERO Commander 560-A

LONGER • ROOMIER • MORE COMFORTABLE

Twin-bed comfort is but one of the flexibility features made possible by the longer, roomier cabin of the new 5-7 place Aero Commander 560-A. The optional hassock seat unfolds in seconds to provide a seat back, a chaise longue or a comfortable bed for the flying executive.



For complete information contact your Aero Commander distributor or write for Catalog 127-A

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CHAMPION LEADS THE WAY in producing the finest utility aircraft in the low price field . . . maneuvers at low speeds . . . lands in small spaces . . . high visibility with wrap-around windshield . . . carries an economical load . . . cruises at 105 mph.

Famous tri-cushion landing gear increases allowable loads—handles easier in high winds.

The improved Champion is a single engine, 90 h.p. utility airplane—two passenger, tandem type with high lift wings . . . optional radio, skis, floats, hydraulic brakes, self-starter . . . photographic, spraying, dusting and fogging assemblies . . . and many other items of utility and luxury.

Test fly the Champion at one of the distributors listed below. Prompt delivery.

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Champion **AIRCRAFT CORPORATION**

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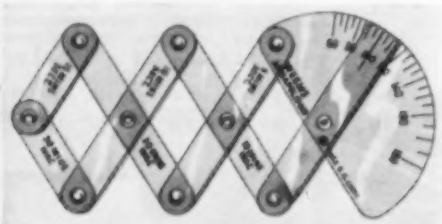
AT LAST ...a simple computer

Brought to you by WEEMS



The new Casey-Myers speed-time Computer is designed for pilotage by light plane pilots under contact flight conditions. Based on "lazy-tong" principle, this computer is the simplest to use that we've ever seen. A series of arms in lattice formation (see illus.) are connected by central eyelet pivots permitting computer to be expanded or contracted in a straight line. Distance between adjacent eyelets represents 10 minutes on WAC charts and 5 minutes on sectional charts indicating distance flown at the ground speed indicated on speed scale. This Computer makes it easy to establish ground speed and ETA while flying. Also enables you to quickly, easily find ETA at any check point for estimated ground speed before takeoff. Designed by The Honorable Richard G. Casey, Minister for External Affairs, Commonwealth of Australia. Only $4.00. See your aviation dealer or order direct from us. Address Dept. 15.

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FLYING CALENDAR

Aug. 27—First annual reunion, OX5 Club, Latrobe Airport, Latrobe, Pa. Russ Brinkley, Chairman, WHB, Harrisburg, Pa.

Aug. 27-28—Seattle AOPA Flight to Red's Wallowa Horse Ranch.

Sept. 3-5—World's First One-Design Sailplane Regatta at Harris Hill, Elmira, N. Y.

Sept. 3-5—National Aircraft Show at Philadelphia International Airport, Phila., Pa. Contact Benjamin T. Franklin, Gen'l Mgr., 400 Union Commerce Bldg., Cleveland, O.

Sept. 3, 4, 5, 6—Seattle AOPA Flight to Reno, Nev.

Sept. 5-11—Flying Display and Exhibition of The Society of British Aircraft Constructors, Ltd. at the Royal Aircraft Establishment, Farnborough, England.

Sept. 8, 9—Reunion, Air Mail Pioneers, Western Division, at Cosmopolitan Hotel, Denver, Colo.

Sept. 11—Sixth Annual Triple S Fly-in Breakfast sponsored by Joplin, Mo., Chamber of Commerce at Municipal Airport, Joplin, Mo. Rain date, Sept. 18.

Sept. 17—International Grand Prix Races for sports cars at Watkins Glen, N. Y. Offers 3,000 ft. sod runway less than 1,000 ft. from the race course.

Sept. 17-18—Seattle AOPA Flight to Powell River, Kamloops, B. C.

Sept. 18—Walla Walla (Wash.) Chamber of Commerce Air Fair.

Sept. 21—Southwest Airmotive Engine Forum, sponsored by Pratt & Whitney and Bendix, at Melrose Hotel, Dallas, Texas.

Sept. 23, 24—Tenth Annual Paul Bunyon Pilots Initiation, Traverse City, Mich. Contact Merle Lutz, Sec. of Ch. of Commerce, Traverse City, Michigan.

Sept. 25-27—International Northwest Aviation Council's 19th Annual Conference at Yakima, Wash.

Sept. 30—Three-day Flying Farmer District Meet for Idaho, Oregon and Washington at Yakima, Wash.

Sept. 30-Oct. 2—Flying Farmers Regional Convention at Yakima, Wash.

Oct. 1-7—National Flying Clubs of America's First Annual Meeting, Seattle, Wash.

Oct. 5-7—Eighth Annual Meeting and Forum of National Business Aircraft Association at Sheraton-Cadillac Hotel, Detroit, Mich.

Oct. 8-15—All Texas Air Tour—the seventh annual tour. Contact Texas Aeronautics Commission, Austin.

Oct. 18—7th Annual Aerial Spraying and Dusting Conference Wenatchee, Washington.

Calendar items must be received at FLYING's editorial offices, 366 Madison Ave., New York 17, N. Y., three months prior to the event.

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The versatility of the USAF Tactical Air Command . . . its mobility and atomic capabilities . . . combine with Ground Support equipment to provide assurance of effectiveness ***When seconds mean survival .*** ▷ Ground Support equipment of unquestioned reliability is indispensable should the need of defense or retaliation demand that TAC "rise" to the occasion in protection of our freedom. ▷ Through design, development and manufacture, we have solved the most complex ground support problems . . . providing the Tactical Air Command with a self-propelled multi-purpose unit, which combines towing, testing, servicing and/or starting for all types of aircraft under the most difficult operational conditions. The M A-1 and other type ground support units. are now being used extensively by the USAF, Navy and Marines . . . and are ***consolidated for greater power and versatility.***

THE ALL-PURPOSE MA-1 HELPS GREATLY TO SOLVE THE MOBILITY PROBLEM . . . FOR ONE UNIT TAKES THE PLACE OF FOUR OR FIVE

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FLYING
VOLUME 57, NO. 3
SEPTEMBER, 1955

AN EDITORIAL

Beyond Old Perimeters

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• • •

YOU can touch all the dots in the pattern with four continuous straight lines, without retracing and without lifting your pencil from the paper. But you can't do it if your mind refuses to go beyond the perimeter of the pattern. And therein lies the philosophy which prompts this editorial.

American aviation moves by fits and starts, bulging at one point, sagging at another, because we lack a national policy to provide guidance for a comprehensive and logical sequence of airpower architecture.

Heaven knows we have spent enough money on aviation, civil and military, to have realized its greatest potential in the United States. But we have never built great ramparts because we try to fit the dynamic of aviation into patterns which are not adequate.

Take, for example, a military officer's career as exemplified in the old tradition, and try to pour the career of a jet pilot into it. After ten—maybe even fifteen years riding the firetails—then what? Strip the man and make him over into a swivel chair jockey? How fantastic! Why not junk the old concept, hire the boy as a pilot for fifteen years, give him a bonus of $25,000 at the end of his contract and keep him in regular military service only if he has special adaptability which is required—far cheaper for government and better for the pilot.

Or, let's look at the general aviation picture—the pattern which embraces all but scheduled airlines and military flying.

Here lies the great mass market for equipment and the most prolific field for citizen utility. So what do we offer the masses? The same archaic formula of required pilot skill—inconvenient aircraft, expensive airport facilities, which prevailed in the era of the Wright Brothers. We have never gotten beyond the perimeter of that pioneer pattern. The citizen needs an airplane which he can set down by the roadside; which he can slow down radically in bad visibility, or at night; which he can use without a rigorous course of training and continual practice. An industry which can design the magnificent high performance craft of our civil and military fleet today can also certainly design an aircraft for the mass man.

Why are such aircraft not designed? Well, why can't you draw those four straight lines?

But let's look elsewhere. Navy has done a fine job of specifying aircraft of high performance—vertical take-off, super-sonic speed, atomic capability, and all that. Then, instead of fitting these excellent aircraft into a very high speed, if smaller, carrier of radical design such as a hydrofoil, they stash the space eater on carriers so big they can't even traverse waters where yesterday's carriers were at home—new wine in old wine skins.

And Army, with that "Forever Amber" complex, quarrels about having its own tactical airplanes to support the G.I.'s job, at a time when air logistics is the really critical requirement. The only kind of an army with significance is one which has complete air mobility. Even the freshest cadet out of West Point knows this to be true. Of the first 100 cadets who got their choice of service this past June, only one chose the infantry—the majority choosing either aviation or the armored branches.

Now I'm not "for" anybody or "against" anybody. We are all in this circumscribed pattern together and for the sake of the country must get beyond its perimeters in many phases of aviation. National policy is the place to start. We just can't afford to muddle along with the world at our throat in one way or another.

I've been studying the Air Force recruiting effort. It operates with great conscience and surprising genius, but is circumscribed in its efforts by lack of aviation motivation among youth at the community level. For their own selfish ends, if for no other reason, both Army and Navy aviation, and Air Force should get behind civilian youth programs. National airpower is not divisible by civilian and military lines, much as they might like to think so. This is another day and the old perimeters won't serve aviation.

I respectfully suggest to the President or the Congress, or to both, that they pick out a handful of experienced and practical airmen with deep insight into our aviation problems, and set them the task of evolving the elements of a national program for executive and legislative consideration. None but the airmen themselves have been deeply enough into the subject to escape entrapment by the old perimeters. And that is the key to any real effectiveness.

And now if you haven't gotten all those dots joined by the four lines, turn to page 50 and see how simply it is done when you go beyond circumscribing perimeters.

Gill Robb Wilson

Gill Robb Wilson
Editor and Publisher

AMERICA'S FIRST TURBO-PROP AIRLINER!

This will be a history-making airplane—the first to be produced in America with modern turbine-propeller engines. This will be an all-new airliner—new from the radar in the nose to the graceful control surfaces in the rear. The Lockheed "Electra" results from combining the abilities of two leading organizations in aviation:

The proven design and construction ability of Lockheed Aircraft. The unequaled operating experience of American Airlines.

SPEED—Cruising at well over 400 miles per hour, the "Electra" will be faster by far than any other transport plane in world operation today.

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COMFORT—This new airplane will introduce a new and heretofore unequaled standard of airline comfort: spacious, club-like lounge; wider, more comfortable reclining chairs; wide-view rectangular windows; air conditioning on the ground as well as in flight; improved cabin pressurization to provide pleasant cruising at all altitudes up to 30,000 feet.

CONVENIENCE — Innovations in passenger convenience will include: carry-on baggage facilities; improved design for faster handling of checked baggage; built-in steps to eliminate ramp delay; individual fixed tables for dining, reading or writing.

The new "Electra" fleet for American Airlines will improve air transportation and strengthen United States air power.

AA
AMERICAN AIRLINES
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AFRICAN APACHE

The 12,400 mile delivery flight of "The Spirit of Pretoria" proved that far travel need not be difficult.

By HOWARD PIPER

THE 153RD *APACHE* ROLLED from the production line on February 11, '55, and carried no registration numbers until her South African matricula was designated—ZS-DLD.

According to the most recent phonetic alphabet, ZS-DLD would be identified in radio calls as Zulu Sierra-Delta Lima Delta,—words about as awkward as might conveniently be found, so we used the previous and still generally favored phonetic alphabet and called her Zebra Sugar Dog Love Dog, or, for short, Dogs Love Dog, which is not only less of a jaw breaker but is most likely a true statement.

Unofficially, my brother Bill and I wanted a name for the *Apache* we were to deliver to Africa with a little more appeal than DLD, something that could be painted on her nose to add a touch of color and give an idea of her mission. So we called her "The Spirit of Pretoria," because that was where she was going. For the benefit of those who didn't know where Pretoria is, we printed a small "South Africa" under the Pretoria, and added the "Spirit" in the form of a monkey with wings and a halo. The halo was a wrap of the tail over the monkey's head. Most people missed the significance of the monkey but thought the insignia was amusing.

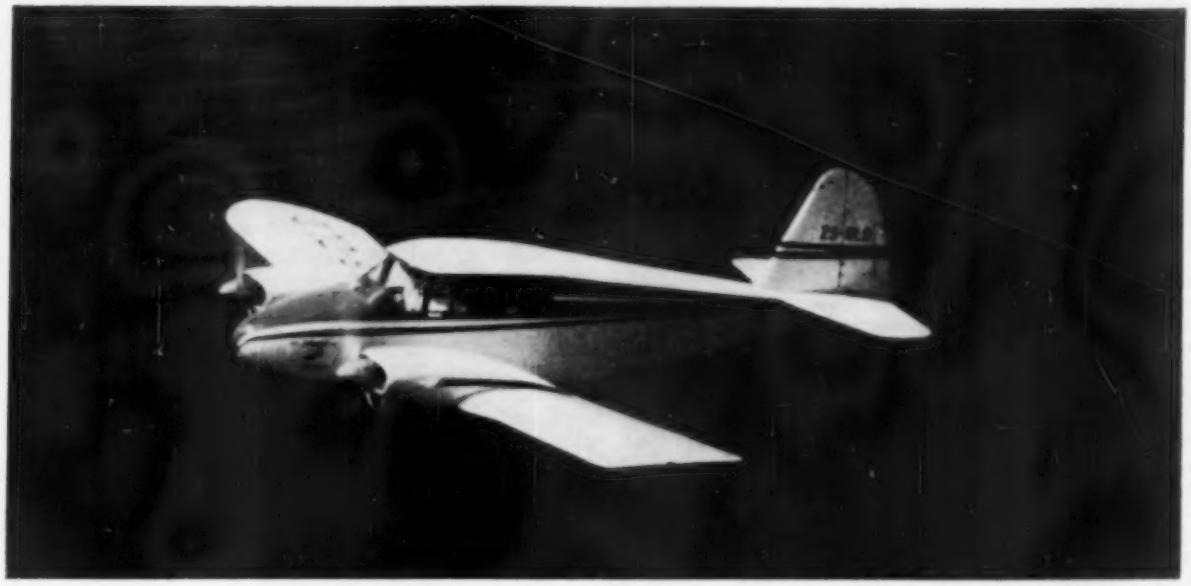
We allowed only three weeks for flight test work, including installation of special radio equipment and long range fuel tanks. By pushing a little we managed to leave on Monday, March 7 and the "Spirit of Pretoria" cruised non-stop to Fort Lauderdale, Fla., with enough fuel aboard to return to Lock Haven.

The author and his brother, Bill, with their father, W. T. Piper, Sr., at Fort Lauderdale, Fla., before take-off on delivery flight of Piper *Apache* to Africa.

The rather unusual, not too practical course the "Spirit of Pretoria" was to follow from the factory to the South African Piper distributor, the Pretoria Light Aircraft Company, was chosen for a number of reasons: We were interested in getting out of cold weather as quickly as possible. The route across the North Atlantic, although shorter by 2,000 statute miles than our 12,400 miles of pilgrimage via the South Atlantic could be difficult during the winter for a relatively small plane with no deicing equipment. Flying directly from Lock Haven to Fort Lauderdale would give us opportunity to check airplane and equipment before starting over water, and the southern route would be more interesting. We wanted to make a movie showing how an *Apache* could be used for recreational travel to the West Indies and South America. No small plane had to our knowledge, made a crossing of the Atlantic from Brazil to Africa, and this flight would constitute a "first." The flight would give us a chance to demonstrate the suitability of the *Apache* for trips of this sort.

This flight, therefore, was made via Lauderdale, Cuba, Haiti, through the West Indies to Trinidad, and down the northeast coast of South America to Natal, Brazil. From Lock Haven to Natal, is roughly 5,000 miles. From Natal across the South Atlantic to Monrovia, Liberia, is 1,900 miles, the only long over-water flight on this route. From Liberia we flew another 5,000 miles, down the west coast of Africa to Leopoldville, Belgian Congo, then inland and down the center of the continent to Pretoria.

If we were to make this trip strictly as a ferry flight, the pre-



The "Spirit of Pretoria" approaching the African coast.

ferred route would be New York to the Azores via Gander avoiding stops in Greenland and Iceland; then to the Canary Islands, or to the northwest coast of Africa; and from there down the west coast again. This route would total only 9,700 statute miles.

Radio equipment installed in DLD was selected for long range, over-water navigation and communications, as well as for shorter range in South America and Africa. We were particularly interested in Automatic Direction Finder bearings over the Atlantic and in ability to communicate with shore stations from long distances at sea in case of emergency. As it worked out, the ADF reception throughout the trip was fantastically good, and the long range, low frequency communications, hampered by heavy static over the Atlantic, was almost never needed.

By far the most important piece of equipment on our flight was the ADF, or Radio Compass as it is frequently called. A Lear ADF-14 was installed in DLD, with the loop on the belly and a long sense antenna overhead. It is difficult to speak too highly of this installation—entirely nose free, powerful and clear, with an amazing range and sensitivity.

Our first indication of what to expect of the ADF-14 came on a flight in the West Indies near Trinidad when we picked up a Brazilian station 750 miles away. During the Atlantic crossing, when we particularly wanted ADF guidance, we were never out of reach of at least four stations from one side or the other, frequently both. We received strong positive signals from Parnaiba, Brazil, 500 miles northwest of Natal, almost all the way to Africa. We received Dakar and Conakry, on the west coast of Africa 1,200 miles out, and were able to home on our destination, Roberts Field in Liberia, for about 1,000 miles.

Not only was the ADF invaluable on the ocean crossing, but extremely useful in finding our various stops and check points in the Caribbean area and Africa. The ADF-14 has a feature called a BFO (Beat Frequency Oscillator) which enables the pilot to pick out, by tuning in a squeal rather than a code signal, stations which are too weak or distorted by static to tune normally; or stations which broadcast only a tuneable signal every 30 seconds, as many stations in Africa do. It also has a tuning meter which indicates when a station is tuned to a maximum signal.

This meter can be used to very good advantage, we found, to estimate distance to a station. When the meter needle approaches its highest reading, you know you have just about reached your destination.

The new owner of the *Apache*, Cyril Johnston, takes delivery from the South African Piper distributor.

Short range communications on this trip were all by Very High Frequency radio, since VFH use is now standard throughout this part of the world. From Miami south, one frequency—118.1 megacycles for receiving and transmitting—can be used almost exclusively. We had a Lear LTT6A, which is a tuneable VHF receiver with two VHF transmitter units, capable of transmitting on 24 different frequencies. This equipment functioned perfectly, giving the clear, better than telephone-like, communications we have come to expect with VHF.

The Lear RCBB-T30 combination of a tuneable low and me-

dium frequency receiver and medium frequency transmitter was installed for occasions when it might be necessary to contact a station not receiving VHF for some reason. This set could also serve as a standby in case of failure of our VHF transmitter or ADF low frequency receiver. Although we made a few calls on this radio to stations up to 300 miles distant, it actually constituted our reserve set and was turned off 90 per cent of the time.

All of this radio equipment added up to three receivers and three transmitters, with the ADF as the only navigational set. No omni was installed because practically no omni stations existed on our route south of Miami. The sets weighed 60 pounds total, and cost $3,500 installed.

The extra fuel problem was solved quite simply. Our longest flight, the 1,900 mile Atlantic crossing, should take 14½ hours at 130 mph ground speed, figuring on a 20 mph headwind. At 130 mph GS, or 150 mph True Air Speed at 10,000 feet, we should use 13 gallons per hour, giving 10 miles per gallon. We would therefore need 190 gallons for 1,900 miles, plus an extra 40 per cent for reserve. By adding 200 gallons to the normal fuel capacity of 72 gallons in the *Apache*, we would have 272 gallons total, or 2,720 miles—a 43 per cent reserve. These computations were figured at an economical cruise setting of 52 per cent power at 2,100 rpm at 9,000 to 10,000 feet, at an average overload. The *Apache* normally cruises in the neighborhood of 170 mph at 17 gallons per hour.

To provide 200 extra gallons of fuel, two aluminum tanks 36″ x 36″ x 18″ were made up, the rear seats from DLD removed, and the tanks slipped through the door and fastened down, side by side. In the face of each tank was an outlet, and a valve connected a line to the engine on that side. Each tank also was fitted with a small dump valve with a line overboard, so that fuel could be scavenged if necessary to reduce the load to single engine operation requirements, in the event of engine failure soon after take off.

The extra 1,200 lbs. of fuel, plus 75 lbs. of tanks, two pilots, baggage, life rafts, cameras, and miscellany, brought the gross weight of DLD up to 4,500 lbs.—1,000 lbs. over the normal gross. *Apache* take-offs with this load were no problem, requiring only some 1,500 feet on a hot day at sea level. The rate of climb was reduced noticeably but we could climb to 9,000 feet in 40 to 50 minutes at normal climb settings.

No provision was made for addition of extra oil, since experience had shown that the 150 hp Lycoming engines in the *Apache* could be expected to use a negligible quantity over a 15 to 20 hour period. This proved to be the case with the "Spirit of Pretoria" which averaged a pint of oil per 20 hours of flight on one engine, and little more on the other. Oil was changed at Accra, in western Africa. During the 29 hour flight from there to Pretoria, only one quart of oil was added to one engine.

Over the entire flight of 93 hours, we added 3½ quarts of oil per engine, not including an oil change, which gives an average of one quart for each 3,500 miles, or each 27 hours of operation.

Total fuel used was 1,255 gallons, for an average of 13.5 gallons per hour. Average ground speed was 133 mph. This ground speed figure reflects a certain amount of digression from course for sight seeing and photographic purposes; and also points up a disadvantage of the South Atlantic route—the unrelenting headwinds created by the Prevailing Easterlies or Trade Winds. Headwinds were encountered during all but 5 of the 93 hours, and even during those hours the winds were across—never on the tail. The average headwind factor was 15-17 mph.

The painful part of the refueling operation—paying the bill—was accomplished with the aid of a Shell International Credit Card. At each of the 16 stops, refueling service was promptly started and quite efficiently carried out, considering the equipment at hand, by up to 8 to 10 native gas boys. Our 80-87 octane fuel was usually available, pumped by hand from drums or small hand propelled dollies. Since 100 octane could always be obtained from a gas truck, and we frequently had to take on 100 to 200 gallons of fuel, we often used 100 octane rather than wait all afternoon for the hand pumping procedure.

Although 100 octane in these 150-hp engines is not recommended, intermittent use of 80-87, 100 and even 73 octane was quite satisfactory on this flight, and we experienced no plug fouling or difficulty of any kind. There was never a sign of water or dirt in the fuel, which was always carefully poured through a chamois. Fuel costs varied from a low of 20 cents per U.S. gallon at Trinidad, to 78 cents per gallon in Natal. At Haiti it was 51 cents, at St. Thomas 50 cents, and through Africa an average of 50 cents per gallon.

It was usually impractical to ask the price of fuel in cash, because either we and the gas boys couldn't understand each other, or because they just didn't know prices. In any event, in converting from francs per litre, or cruseros per litre, or shillings and pence per imperial gallon to U. S. cents for (*Continued on page* 50)

Above: ". . . refueling service was quite efficiently carried out . . . by eight to ten native gas boys."

Left: Wild animals as sighted from the *Apache* over Southern Rhodesia.

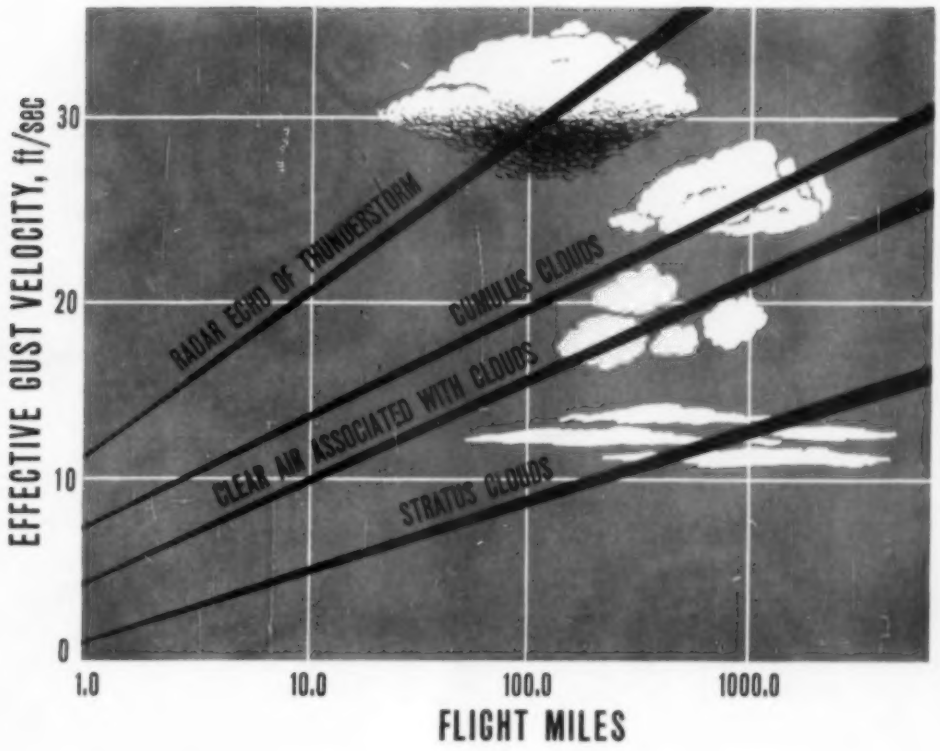


FIG. 1.

Great strides have been made in overcoming problems of all-weather flying, but one which is not so amenable to solution is

TURBULENCE

By E. T. BINCKLEY

TURBULENCE IS RAPIDLY becoming the only weather element that cannot be partially overcome with mechanical or electronic devices. Only anticipation by the pilot can meet the turbulence problem.

Inasmuch as turbulence is associated with all types of air and all altitudes, it has been difficult to predict. Progress has been made in anticipating certain types, but no all-inclusive method has been proposed. Therefore, we must recognize that, if we fly for any length of time, we will probably fly through some type of turbulence. Air, being a fluid, is analogous in many ways to water. To disturb water, there must be an outside influence or combination of influences—gravity to make it flow, wind to ripple the surface, or heat to cause convection currents (as we see in glass coffee makers).

Similarly, air must be disturbed to have movement, and movement causes turbulence. Shear type turbulence results from wind activity. Convective type results from heating.

Turbulence in the atmosphere ranges from nil to violent. Ideally, non-turbulent air is probably most closely approached early in the morning. At this time surface temperature is fairly constant and surface winds are negligible. The ambient air mass is stable.

Turbulence reaches its maximum intensity in thunderstorms, hurricanes, and relatively infrequent tornadoes. From a pilot's viewpoint, thunderstorms, because of their wide distribution and frequency, greatly exceed the importance of hurricanes and tornadoes. Between non-turbulent air and the thunderstorm lies a variety of atmospheric conditions with varying degrees of associated turbulence. We may generally classify the atmosphere in two categories—clear sky, where visual flight rules apply; and overcast, where instrument flight must be used.

The clear sky category may be subdivided into sky associated with clouds and not associated with clouds. If the clear sky is associated with cumuliform clouds, we have a definite indication of unstable air rising by convection until its moisture (*Continued on page* 60)

The author is Ass't Chief of the Fifth Phase Test Section, Directorate of Flight and All Weather Testing, Wright Air Development Center at Wright Patterson AFB, Ohio. In 1947, he joined the National Advisory Committee for Aeronautics, Gust Loads Branch, to evaluate and analyze data resulting from NACA's participation in the Thunderstorm Project.

1

1
Jets give close support to Marine infantrymen during amphibious training.

2
Fairchild C-123B *Avitruc*, assault transport in 18th Air Force.

3
RF-80, powered by Allison jets, is used for tactical reconnaissance.

4
The Douglas C-124 *Globemaster* is the largest troop carrier.

5
First turbo-prop troop carrier is the Lockheed C-130A *Hercules*.

6
Newest fighter bomber is the swept-wing Republic F-84F *Thunderstreak*.

7
Now operational, the F-100 *Super Sabre* is an air superiority fighter.

8
The Martin B-57B *Night Intruder* bomber used by 9th Air Force.

9
New light bomber, the Douglas B-66A, powered by twin turbo-jets, is now in production.

TAC TACTICAL

No longer just an auxiliary branch to support surface forces, TAC now looms as a decisive element in world wide conflict.

By HARRY S. (BUD) BAER, JR.

2

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AIR COMMAND

FOR THE FIRST TIME since the end of World War II, Tactical Air Command has top priority in the Pentagon, and plans are underway for a big TAC buildup. Up to now, chief emphasis has been on Strategic Air Command, but at last the gong has rung for SAC's euphonious twin and we shall see what we shall see. This current attention to TAC, it should be noted, does not distract from the continuing importance of SAC, which is still the "big gun" of retaliation and in good shape to strike far and fast if necessity arises. TAC has had to wait its turn for priority attention because a major portion of the Air Force dollar over recent years has gone into long range bombers and fighters, refueling tankers, reconnaissance planes, and other equipment needed to perfect SAC's retributive power of devastation. At this stage, SAC is equipped to accomplish its mission, and its program for even better weapons is forging ahead rapidly.

With TAC, the story is different. In deference to civil economy and military surface demands, TAC has not received the modern aircraft needed to accomplish its assortment of assigned missions.

To a great degree, this current emphasis on TAC is a result of the command's newly-gained atomic capability. "The effectiveness of tactical air power has been multiplied many, many times," says General O. P. (Opie) Weyland, TAC's commander. With modern tactical planes now being equipped to deliver nuclear warheads, TAC has become more than an auxiliary branch to support surface forces. It has reached the stage where it can be a decisive element, not only in the "brush-fire" wars but in world-wide conflict as well. Undoubtedly the most versatile of Air Force commands, TAC has a widespread number of chores. Briefly, its missions fall in two distinct areas—combat and airlift. The functions of each include:

COMBAT: Attainment of battlefield air superiority; air interdiction; bombing and air-ground support.

AIRLIFT: Troop and supply movements; paradrop of troops and supplies; aerial resupply of combat forces; and aeromedical evacuation.

Thus TAC's boss has to direct his planning over a widespread problem area. His organization consists of two "air forces," the Ninth, which deals with combat, and the Eighteenth, which deals with logistics. These two forces have elements and bases in 15 states from coast to coast, plus substantial groups overseas.

TAC headquarters is at Langley Air Force Base, Va., a site selected because of its proximity to the Office of the Chief, Army Field Forces, at Fort Monroe, Va., and headquarters of the Commander-in-Chief, Atlantic and U. S. Atlantic Fleet, Norfolk, Va. TAC, of course, works hand in hand with Army, Navy, and Marine Corps.

The Ninth Air Force, headquartered at Shaw Air Force Base, S.C., is responsible for specific functions of tactical air in combat theaters. A breakdown of these responsibilities and concept concerning each of them is as follows:

AIR SUPERIORITY: Authorities feel this can best be accomplished by striking enemy airfields before planes

can get off the ground. But opposing forces will always be able to get some planes aloft, so TAC must be superior in the art of "dog fighting," as it was in Korea.

AIR INTERDICTION: This operation is designed to cut into enemy capability to move forward to a battle area. It is accomplished by continuous attack on all types of ground targets, including communications. As one TAC leader put it, "It saves casualties among our own ground forces, if we can knock off the enemy before he starts shooting at American soldiers."

ATOMIC AND CONVENTIONAL BOMBING: TAC's newly-gained atomic capability has been enhanced by in-flight refueling. Its range of bombing operations, both atomic and conventional, are essentially unlimited in that fighter-bombers and light bombers can be directed where needed. With their long ranges through air-to-air refueling, they can even support SAC. Most of TAC's wings contain aircraft capable of refueling from KC-97 and KB-29 aerial tankers.

CLOSE AIR SUPPORT: A high priority mission of TAC is to provide air coverage to combat units on the ground. This duty of close ground support has shaped up into one of the most controversial chores with which TAC has been confronted. There have been demands, particularly in Army circles, that Army units should be equipped with their own close support aircraft.

Air force leaders do not concur with this suggeestion. They point out that close air support must be under centralized control so that its full weight and power can be shifted quickly from one objective to another. To get the most out of tactical air power, they cite by experience, it must be handled in a mobile, flexible manner for the benefit of the overall operation. Also, they feel strongly that this is the most economical way to put close air support to effective use.

General Wayland is thoroughly aware of his command's obligation to the ground forces. As commander of the 19th Tactical Air Force in World War II and of the Far East Air Forces during much of the Korean War, he has spent years directing close air support under the most intense battle conditions. He expressed his feelings on the matter this way: "Close air support is not a cure-all for all the trials and tribulations of the ground soldier. However, we in the Air Force should, can, and do create the conditions whereby our comrades on the ground can go into battle under the most favorable circumstances for success."

Principal aircraft now used by the Ninth's units include:

- North American F-100 *Super Sabre*—day fighter
- Republic F-84F *Thunderstreak*—fighter-bomber and reconnaissance
- North American F-86F *Sabrejet*—fighter-bomber
- Lockheed RF-80—reconnaissance
- Martin B-57—night intruder bomber
- Martin RB-57—reconnaissance

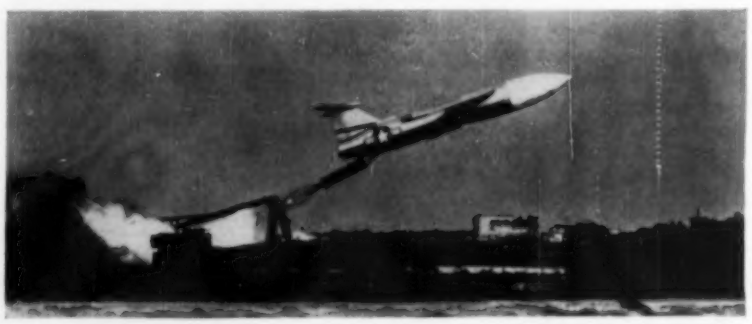
This array of aircraft, although formidable, contains several types of fairly ancient vintage, according to present military standards. TAC formerly obtained a sizable portion of its combat aircraft from SAC in the days when the latter command received the newer types first.

Presently TAC is in better shape in the fighter field with the supersonic *Super Sabres* and *Thunderstreaks* rolling off production lines in quantity; and also with ample supply of *Sabrejets* on hand. Successful development and flight testing of the Lockheed F-104 during the past year is another achievement in the tactical area. The F-104, a fighter in the 1,000 mph class, has achieved excellent supersonic flight performance, according to top Air Force officials, and shows great promise as a successor to the F-100 in the day fighter role. Initial quantity orders for the F-104 were placed during the past year.

In the light bomber field, however, TAC has been lagging considerably. In Korea it had to depend on the outdated reciprocating B-26 for light bombing assignments, and light bombers are still prevalent in TAC groups. It shouldn't be too long until this situation is corrected. Already the speedy Martin B-57B jet *Canberra* is coming into the picture. Additional are the tactical bombardment and reconnaissance versions of the more advanced Douglas B-66, which should be ready for initial operational use before the end of this year.

TAC's aerial punch will be aided considerably by guided missiles, the weapon of the future for which TAC has top priority and is now ahead of the field in missile use in the Air Force. The command already has Martin TM-61 *Matadors* (formerly designated B-61's) deployed in Western Europe. These missiles are capable of delivering atomic attacks and, says General Weyland, the *Matador* "is quite accurate."

During the recent international flareup in Indo-China, the 18th was suddenly called to transport French troops from Europe to Indo-China. A (*Continued on page* 56)



Above: Martin TM-61 *Matador* pilotless bomber, first operational unmanned weapon assigned to TAC.

Left: Fairchild C-119 *Flying Boxcars*, medium troop carriers currently used for paradrops in TAC's airlift.

". . . he inched forward in the inky dark."

STRANGER THAN FICTION

Being an account of some weird happenings during World War II which have defied logical explanation.

By MICHAEL SHELDON

ON OCTOBER 22, 1940, a crewless and undamaged Nazi raider was found landed near Ipswich, East Anglia. Search around Erwarton, where the plane came down, failed to reveal any trace of the crew. The bomber was a regular combat type and was not robot-controlled. To this day, its crew has never been found.

This is one of the World War II mysteries. On record are several such matters, some bordering on the supernatural, because they have defied logical explanation.

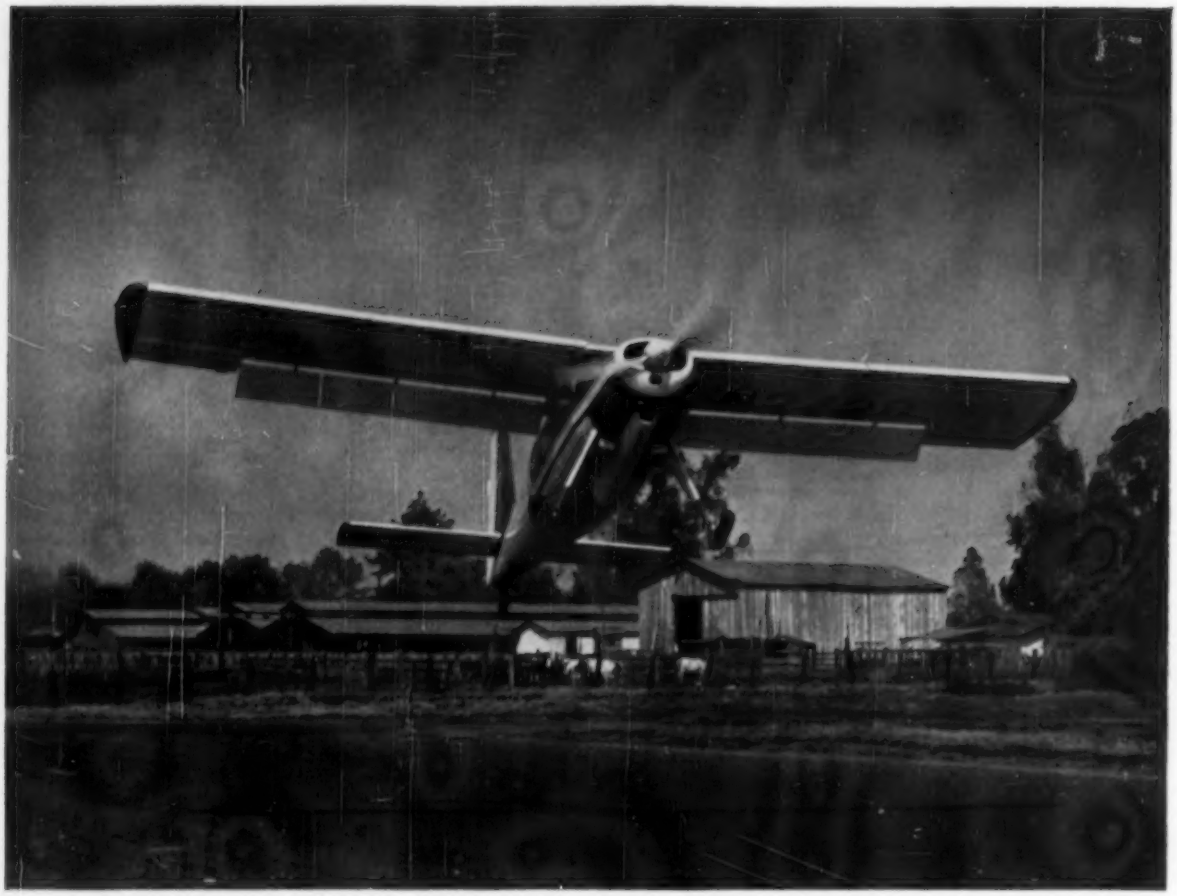
Security measures at the time of the occurrences prevented newspapers from publicizing them, but the local press reported in late October, 1940: "Search is proceeding for the crew of the Nazi bomber which landed near Erwarton, in case any of them survived. Members of the public are asked to keep a look-out for these German airmen and to report anything suspicious to the chief constable of East Suffolk."

RECENT investigation by intelligence experts has revealed that on the night of October 21, 1940, a Dornier 17-Z took off from an airfield in Brittany for a raid on Liverpool. The pilot miscalculated and, instead of approaching Liverpool, flew toward Shrewsbury. Thereafter, in a series of fantastic misadventures with electrical storms and extreme turbulence, the plane apparently cruised around over England until its gas supply was almost exhausted. Figuring from his original miscalculation however, the pilot was convinced that he was somewhere over France and that bailing out would be advisable. Everything below appeared socked in. The pilot ordered the crew to bail out, trimmed the controls to keep the bomber straight and level and then jumped himself. During all this time, the plane was a sitting duck for anti-aircraft guns, but none apparently hit her, for when found, she showed no combat scars. After finding the undamaged bomber, Home Guards and police searched an area of 50 square miles for survivors without success. There was no chance that the German airmen had gone into the sea because they were well inland when they left the ship. A few days later, word reached authorities from Dorchester that the pilot had been captured. He had gone to a hospital as a last resort to have a broken ankle treated but, beyond telling police about the details of his experience aloft, refused to say another word. The other nine crew members were never found.

ON A FREEZING COLD December night in 1941, a German fighter was hightailing from London toward the French coast via England's south coast between the resorts of Eastbourne and Bexhill. He had been badly shot up by Royal Air Force fighters and ground fire and 25 miles from the coast ran into another anti-aircraft barrage.

Within two miles of the Sussex coast, the aircraft took a final direct hit and was seen to crash to earth in flames. Farmer John Hayter, of Pevensey, saw a black object detach from the plane and a parachute billow open. Home Guard found the plane a few miles from Eastbourne. Hayter told of having seen something that looked like a parachute coming down into the interior of Sussex, but owing to the dark, was unable to be certain of what he had seen. It might have been a part of the plane breaking away, he admitted. There was no pilot in the plane, nor any indication of what might have happened to him. The parachute was missing from its rack.

Although the possibility was remote, Eastbourne's lifeboat was sent out to search the coastal area but found no trace of the pilot. A thorough search throughout Sussex and the neighboring county (*Continued on page* 58)



The *Courier* hops off from El Monte Airport. You can haul back on the stick before the airspeed has hit 40 mph and go upstairs in a hurry.

FLYING's CHECK PILOT

CHECK PILOT REPORT

ON THE

Helio Courier

Unique design features give spectacular performance to this rugged utility plane.

By DON DOWNIE
Former ATC Pilot on the Burma Hump

"DID YOU SEE THAT PLANE come in just now?" asked a spectator in the airport coffee shop. "It was going so slow the pilot could have climbed out and walked." Our goggle-eyed friend was just about right. He'd been watching Lynn Bollinger land the Helio *Courier*. The amazing Helio will fly at 30 mph, and still cruise at over 150.

For this FLYING Magazine Check Pilot Report, we met Mr. Bollinger at the 2,000-foot El Monte Airport, just east of Los Angeles. The Helio president began flying in 1926 and has been a fixed-base operator in Cincinnati, an American Airlines pilot, and has served on the faculty of the Harvard Business School, where he published several books, including an aviation market survey titled, "Personal Aircraft Business at Airports."

Bollinger landed the *Courier* in about three plane lengths and taxied to the parking ramp. In response to the flood of questions as he climbed out, the company president said, "There's really nothing new about this airplane. Every feature of it, with the exception of the 'interceptor device' has been used on other U. S. aircraft."

The production model of the Helio has two-piece leading edge slats; a fully movable, one-piece elevator-stabilizer; single-slotted flaps that cover 74 per cent of the span; Griswold seat and chest belts; and the unusual "interceptor" spoiler that gives positive aileron control even below the theoretical minimum flying speed of 30 mph.

"I'll show how this interceptor works," said Bollinger.

"This is the first time I've explained this system for any publication, but I think we're far enough ahead of competition now to talk about it.

"The interceptor is a spoiler-type gate manually connected with the aileron so that it raises behind the open slat when down aileron is applied, helping to decrease lift and drop that wing. At higher speeds, when the free-floating slats are not extended, the interceptor has little effect. To make 35-mph approach speeds possible in this airplane, an unusual degree of aileron control at low speeds is obviously required and this interceptor does the job very nicely."

To obtain good boundary layer control and eliminate risk of stalling at slow speeds, the *Courier* uses the Handley-Page (British) type of automatic slat. These two-piece "eyebrow" slats pop out when air pressure against them indicates that the wing would otherwise stall. The slats are in two completely unconnected sections on each cantilever wing. The slipstream from the propeller makes inboard and outboard sections frequently operate at different speeds. During CAA certification, one slat was tied open, the other closed, to set up the worst possible aerodynamic unbalance. In this condition, the Helioplane still passed all normal control and stability requirements with flying colors.

Basic design engineering for the Helioplane came from Dr. Otto C. Koppen, Professor of Aircraft Design at Massachusetts Institute of Technology. It is natural that the patented Koppen exhaust augmenter system would be installed on the Helioplane. Exhaust augmenters are the first really new development in engine cooling since advent of the air cooled engine. The large exhaust augmenter tube sticks back from the engine compartment and acts as an evacuation pump in which each charge of exhaust gas serves like a piston to suck large quantities of heated air from the engine compartment. Horsepower normally pumped overboard through the exhaust pipe is used in the Koppen system to siphon hot air from the engine. Similar installations are used on the Convair-Liner, the de Havilland *Otter* and the Fletcher "jet cooled" *Navion* kit. The Helio installation also has manually operated cowl flaps at the rear of the engine compartment.

The *Courier* is fully CAA certificated and now in production in both Canada and the United States, being built by Fleet at Ft. Erie, Ontario, and by Mid-States Manufacturing Corp. of Pittsburg, Kan. Flyaway price is $24,500. Number one delivery from the U.S. production line has been purchased by the Helin Tackle Company of Detroit, and is being licensed for floats. Number two production unit, owned by Dudley V. Talcott of Farmington, Conn., was the plane flown on this pilot report. Mr. Bollinger estimates production this year at 30 units, and over 100 next year. No military orders are contemplated at this time.

Walking around the *Courier*, one gets the impression of a big airplane. The span is 39 feet and the rudder stands 8 feet 8 inches. A six-footer can walk under the full cantilever wings. Gross weight, at this writing, is 2,800 pounds, but is expected to be raised by CAA to the full 3,000 pounds design gross in the near future.

Both the rudder and elevators are very long and narrow. This high aspect ratio gives better control at slow speeds. The complete elevator moves, and there is no fixed stabilizer; yet the airplane has no tendency to "hunt" in flight.

The 260-hp geared Lycoming engine swings a 101-inch Hartzell constant speed propeller. Mufflers are installed both in the exhaust system and the augmenter tube. The relatively slow speed propeller coupled with this dual muffler system make normal conversation possible in flight.

The long-legged landing gear (*Continued on page* 64)

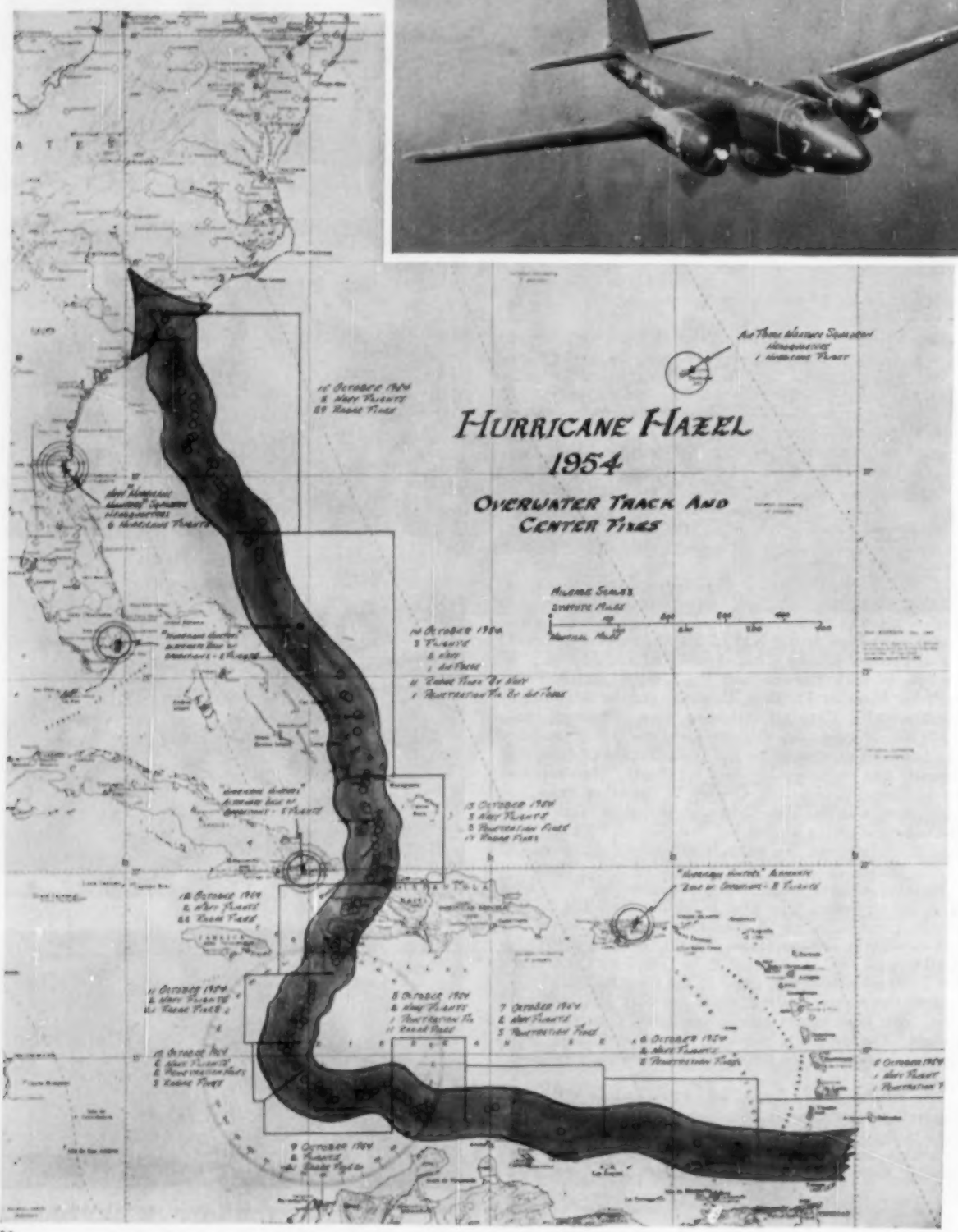
In flight, the big four-place plane has a neat, efficient look to it.

Mr. Bollinger indicates the "interceptor" device, a spoiler-type gate.

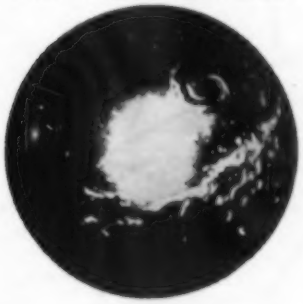
Exhaust augmenter system sucks heated air from engine compartment.

Note mufflers on exhaust manifold of 260-hp geared Lycoming engine.

Tracking Hazel's roaring route for nine days, Squadron Four made 148 center fixes—the small circles within the storm's path. Inset is a Lockheed P2V-3W *Neptune*, hurricane hunter craft.



Hurricane Hazel as she appeared on radar scope in a Hunter aircraft.



HURRICANE WATCH

Veering through the Caribbean like a temperamental shrew, Hazel was the most vicious of them all.

By REAR ADMIRAL D. V. GALLERY
and
THE MEN OF SQUADRON FOUR

EDITOR'S NOTE: *This autumn, as every other, will bring its quota of hurricanes whirling in from the South Atlantic to lash our shores from the Caribbean to Newfoundland. Once their furious surprise was a sure tax on life and property . . . still is, but vastly reduced in degree by the watchdogs of our military services.*

Last autumn, Hurricane Hazel was the most vicious strumpet of them all. We have asked Admiral Dan Gallery to tell the story of one group who fought her from beginning to end . . . Navy's Airborne Early Warning Squadron Four. It is an endless battle, year upon year, but the story of Hazel is a pattern of them all.

A crewmate steadies Navy photographer, B. D. Mitchell, while he takes photos of the raging, hurricane-driven sea. Mitchell was injured while in such a position when the aircraft was bounced by the violent winds within the storm.

EARLY LAST OCTOBER in Miami, a group of Navy scientists took an anxious look at their latest weather charts. Swinging southward from a routine mid-Atlantic storm, a deep trough of low pressure entered the tropics. Here, in an area of warm water and moist air, hurricanes breed.

As the trough invaded the tropics, the prevailing east winds were channeled in a semi-circular path. The normal tropic circulation was disrupted, and the stage was set for the career of Hazel. East of the lonely Caribbean isle of Grenada, small patches of clouds swung into spiral patterns, as shifting winds converged on a low spot in the pressure field. Surface pressures were falling rapidly in the Windward Islands. Although late in the hurricane season, the outposts in the Caribbean were indicating a bad situation. Soon a message was on its way to San Juan, Puerto Rico.

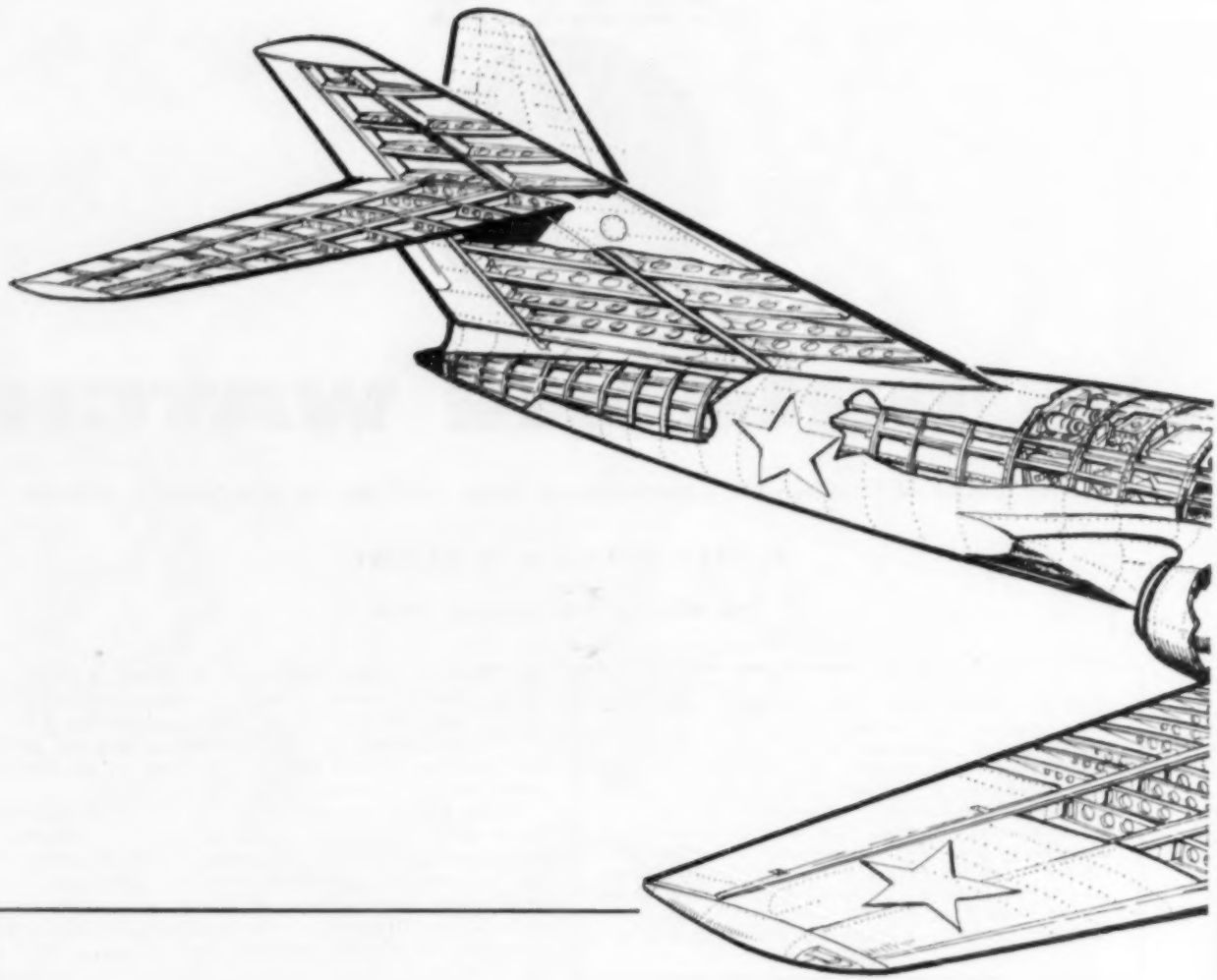
In San Juan, a detachment of Airborne Early Warning Squadron Four, the Navy Hurricane Hunters, waited impatiently for its relief and subsequent return to "the States". Instead, it received orders for immediate take-off. The dispatch said, "Investigate vortex forming near thirteen degrees North, sixty-two point five degrees West."

Quickly a crew was airborne, and a solitary plane began probing the thousands of square miles surrounding its search point. As the plane neared the suspicious area, streaks of spray were sweeping the water. The placid blue of the Caribbean was changing to ominous racing foam The plane spiraled into the relative calm of the "eye".

"Position twelve degrees six minutes North, sixty degrees fifty-nine minutes West; maximum wind eighty-five knots," the aerologist radioed back to Miami. Thus a few short hours after embarking on her spree, Hazel was identified and pinpointed on the map

That first flight began a continued effort, consuming 3,500 flight-man-hours by the Hurricane Squadron, an effort unsurpassed in the history of these hurricane specialists.

On October sixth, as the storm moved slowly (*Continued on page 74*)



RED MIKOYAN

An all-weather interceptor believed to be designed for climatic conditions in USSR.

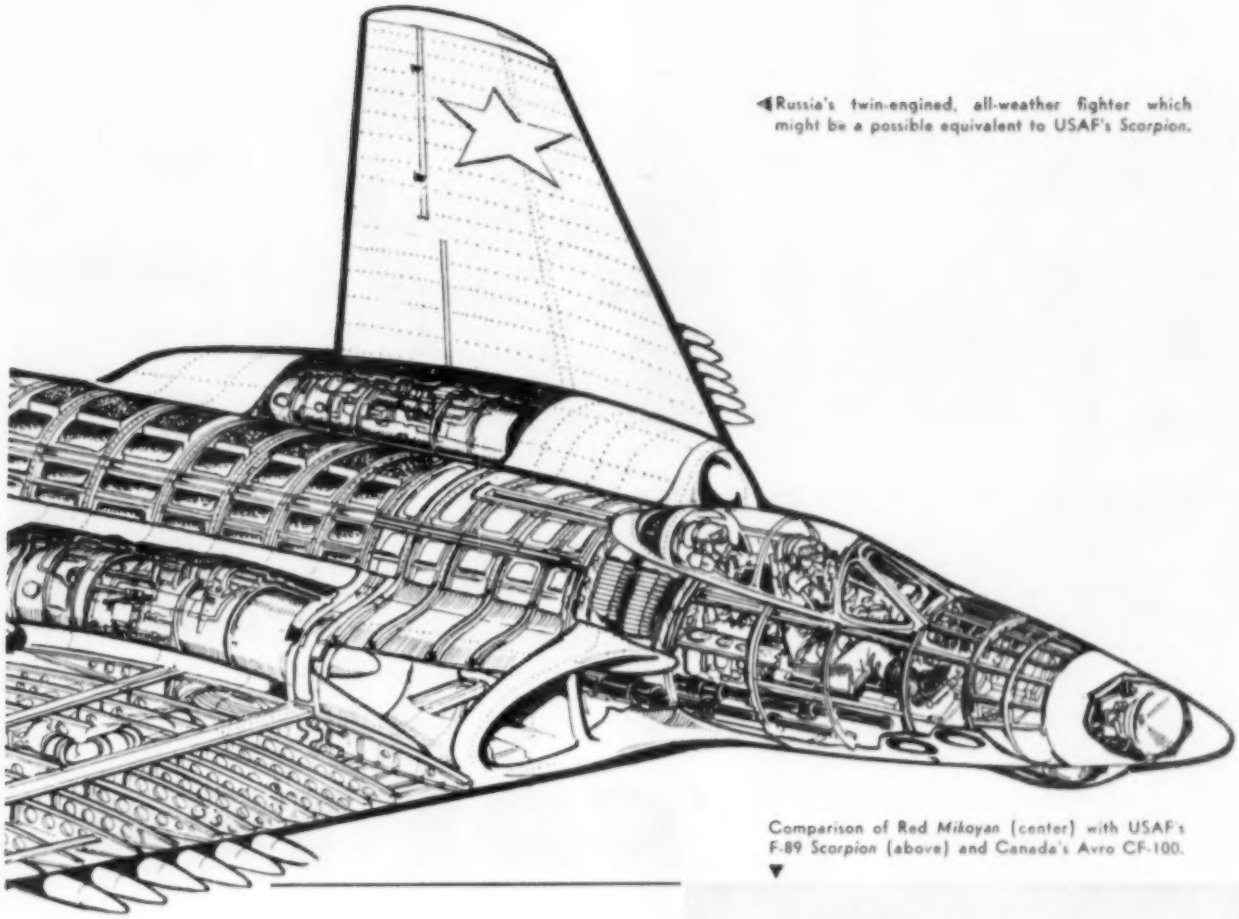
By THOMAS TURNER

IN THE VAST SOVIET, stretching 5,000 miles from the Baltic to the Pacific, are found great extremes of weather. For example, Verkhoyansk in Siberia is the coldest place on earth, while the Black Sea shore is subtropical. In skies so varied as those of Russia, the all-weather fighter is a weapon of imperative need.

Such an aircraft must be relatively big to carry a crew of two along with radar equipment, armament, and associated instruments. Thus two engines seem necessary, although they double fuel requirements and require heavier supporting structure.

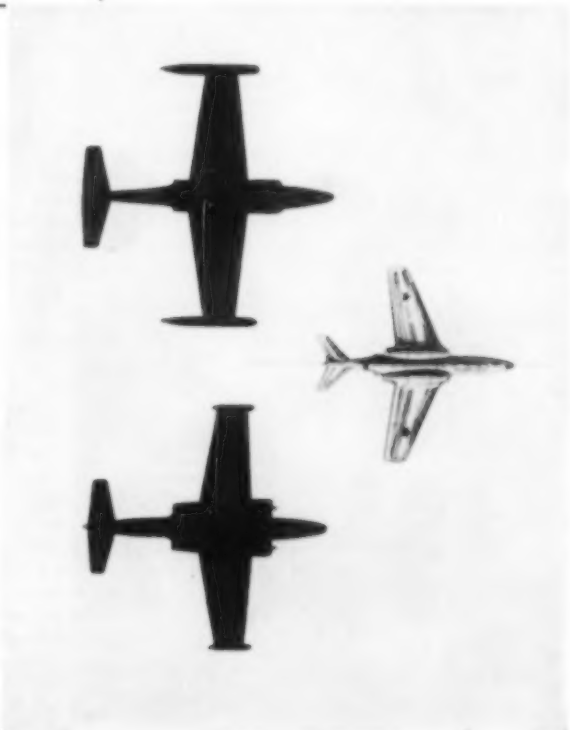
The Soviet *Mikoyan*, so named provisionally as it is presumed to have been designed by Mikoyan, is a low-wing, swept planform. The free world has seen little of it, but from photos and known engineering practice, this drawing is made to show how the craft is constructed and arranged.

Radar is housed in the nose. A conventional canopy covers the two-seat cockpit. The airman in the rear seat is both navigator and radar operator.



◀Russia's twin-engined, all-weather fighter which might be a possible equivalent to USAF's *Scorpion*.

Comparison of Red *Mikoyan* (center) with USAF's F-89 *Scorpion* (above) and Canada's Avro CF-100. ▼



Due to engine positions, air intakes on either side of the fuselage complicate wing-fuselage attachments but give a fair aerodynamic formula. The wide, flat-bottomed fuselage helps give lift and also solves the landing gear stowage problem. Fuel is housed amidships between the engines and behind the armament bay. The jet exhaust streams along the rear fuselage might cause trouble unless high temperature shielding protects these regions. After Soviet design fashion, the vertical stabilizer is quite large and the Mig-like horizontal tail plane is set clear of the jet blast.

When Canada laid down specifications for the Avro CF-100, Edgar Atkin and his design team produced an aircraft to meet requirements of an area similar in many respects to parts of Russia. The configuration of the *Mikoyan* is not unlike the CF-100 in numerous features.

Our Northrop F-89 *Scorpion* is the counterpart of the Canadian and Soviet all-weather interceptors, so a plan view of the three models is shown. Performance comparison is not available. END

Left: Helen Morgan makes a graceful dive from helicopter into vee formation of water skiers.

Above: Esther Williams and Van Johnson as they appeared in MGM's film, "Easy to Love."

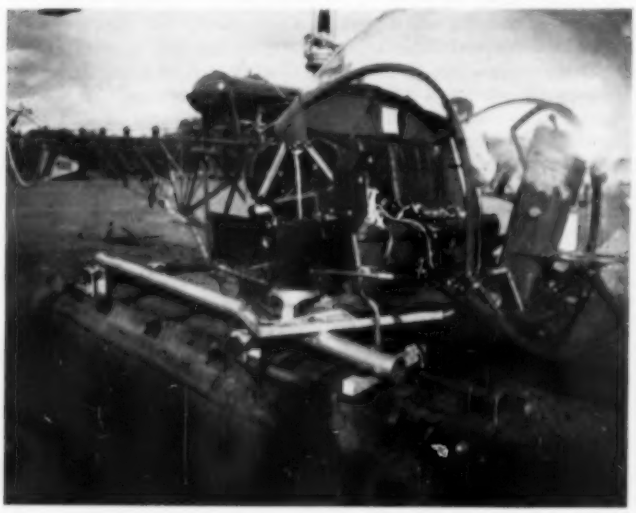
'COPTER

Boat tows vee of water skiers through a group of mangrove trees while helicopter hovers overhead to obtain difficult angle shots.

More than 30 hours were spent setting up, practicing and "shooting" the water routines from the helicopter.

CAPERS

Intricate camera installation on a float-equipped Bell helicopter owned and operated by Rotor Aids, Inc. specialists in camera flying



IT IS OUR AMPHIBOLOGICAL observation that Esther Williams and her amphiscians could not have made "Easy to Love" so easy to watch unless they had rung the Bell—the Bell Helicopter, that is—into the picture.

Searching for realism, the movie makers have been coining fresh terms of technology as avidly as they have coined superlatives—Cinerama, Stereovision, Vistavision, Cinema-scope, Paravision, Depth-O-Vision, ad infinitum.

We propose that since the Choppers have become not only star performers in so many films, but as well, camera mounts, director's chairs, and scene movers, that they merit some billing. The term Chopperama (for the trade) or Heliorama for more polite society is suggested. In any case, such pictures as MGM's "Easy to Love," "Bridges of Toko-Ri" and "Battle Circus"; or Paramount's, "Atomic City" and "Blazing Forest"; or RKO's "Las Vegas Story," would not have been possible without them.

Pioneer in this marriage of the Whirlybird and the Screen, is ex-Navy pilot, Joe Seward, a partner in Rotor Aids, Inc. of California and Louisiana and, despite this background, an actor of no mean talents himself. Accustomed as he is to the roaring of directors and the temperaments of actors, Seward takes his Chopper flying in stride but his partner, Roy Falconer, says the company's Alaskan survey flying is easier on the nerves.

Personally, we like the idea of Cyprus Gardens, Fla. and a Chopper seat to survey Esther Williams. Phooey on Alaska. END

Group of instructors at Cranwell (now the RAF College) in 1918. Capt. Paddy Pierce (third from left) commanded "A" flight of Squadron 102 in France. Avro trainer is in the rear.

The author as he appeared at the time he was instructing on Handley Pages at Cranwell.

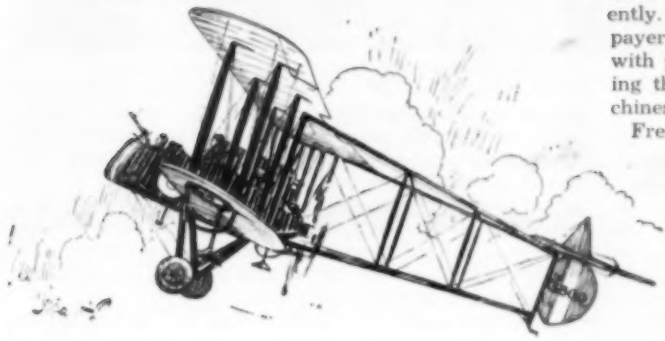
I WAS A NIGHT

NOT LONG AGO I STOOD on an American air base in North Africa watching medium jet bombers of the Strategic Air Command leave on a "routine" training flight that would take them non-stop along the North African coast to Egypt, over Italy and Western Europe to the English Channel, and return to French Morocco. They would be refueled twice, going and returning. The distance flown equalled that of a round trip far into the interior of Soviet Russia.

There were more than two SAC wings engaged in that maneuver—about a hundred bombers. They had been flown non-stop from the United States, England and Europe, accompanied by enough ground personnel and airborne supplies to enable the bombers to operate independently for a month. The simulated mission started the day after their arrival.

As the bombers followed each other at two-minute intervals down the nearly three-mile runway, like metallic elephants in a parade, I realized this was the most phenomenal show I had ever seen, put on by the world's best-trained performers. The planes and their equipment had cost 200 million dollars; the training of 100 three-man crews at $50,000 apiece, was around 15 million dollars; and the air base, along with two others in North Africa, had cost over 400 million dollars; and they were not yet complete with all their fuel lines from the ports, railroads, highways, hangars, workshops, and housing. That one chunk of our national air defense had cost

"This mighty engine of destruction . . . ." the FE2b.



Some reminiscences of the days when aircraft armor consisted of old stove lids and parachutes were considered bad for morale.

By CY CALDWELL

BOMBER

three-quarters of a billion dollars. It was at once heartening and yet disturbing to ponder that the U.S. Strategic Air Command, even with its latest heavy bombers still to roll off the production lines, could in one mass raid cause more devastation than thousands of bombers had effected during the course of two long World Wars. It just doesn't seem possible that, despite all known defensive measures, the industrial heart of a nation could be obliterated before opposing ground and sea forces had ever joined battle. Yet there it is!

Bombing certainly has come a long way, I thought, since I had started in it 37 years ago, flying from a rough grass field near Aire in northern France. It was in September, 1917, that I joined 102 Squadron, Royal Flying Corps (afterwards the Royal Air Force). I was classed as a night bombing pilot, with some 20 hours of night flying on Zeppelin patrols in Home Defense of northern England; and 15 hours solo day flying before that. I had graduated from flying school the previous April; had received about five hours of dual instruction on various types; but had never dropped a bomb—or even seen a Zeppelin or a German aeroplane. I was considered adequately trained for war.

Our aircraft (spelled aeroplanes), were FE2b, pusher biplanes with a 52 foot wing span. The FE was made of wood and fabric, held together with struts and wires, all open to the breeze. A Beardmore engine, a six-cylinder water-cooled job and a direct steal from the German Benz, whipped up a hefty 160 horsepower. On one mag the revolutions dropped 150, but the good old FE still lumbered along. It was said to have cost $10,000, engine and all, considerably more than it had cost to train the pilot, who was regarded as expendable.

We had no parachutes, although they were available for artillery observers in stationary balloons and could have been adapted to airplanes by packing them differently. This had been suggested, but some sturdy taxpayer thoughtfully pointed out that providing air crews with parachutes would undermine their morale by giving them the means to abandon slightly damaged machines—and aeroplanes cost money.

French and Americans apparently took a like view, for right up to the end of the war, American, British and French pilots were being brought down in flames, while, by early 1918, German pilots were using parachutes to escape from uncontrollable or burning aircraft. Good economists!

The FE (pronounced Fee, not as in Santa Fe) was a peculiar looking plane with a nacelle instead of a fuselage. This was a boot-shaped affair with the observer in the nose, the pilot close behind in his cockpit. The controls were not dual and the observer was not trained to fly, so if the pilot were badly wounded or killed, the observer had little chance of getting safely down. That's why there were called PBO's—poor bloody observers.

Between the wings, directly back of the pilot, sat the mighty Beardmore engine, weighing three or four pounds per hp. In a crash, if the pilot and observer were not thrown clear, the Beardmore tore loose and squashed them. That is why the pilot and the PBO in a FE invariably unbuckled their safety belts when headed for a crack-up. This feature of the FE made pilots very thoughtful and the smart ones asked for transfers to squadrons flying any aircraft with the engine and propeller in front. But night-bombing pilots, like scout (fighter) pilots, were considered a special breed, linked for life to the FE until death did them part. Even after I had completed ten months of night bombing in France and was sent back to England for a rest, the restful job I got was training youths in night flying. On FE's naturally, fitted with dual controls.

The FE had another, though harmless, peculiarity. It had so many struts and wires between the wings and between the four booms holding the tail, that when it was flying at full speed—around 75 mph—the wires and struts made a whistling sound you could hear above the clatter of the engine, which had outside tappet rods and a valve mechanism that free-wheeled on top of the cylinders. This actually was a safety feature. If you couldn't hear the wires whistling, you were headed into a stall.

Even with only 160 hp, the FE was a good weight-carrying craft, for it had a large wing area. It carried a crew of two, 25 gallons of petrol, two 112-lb. bombs on racks under the bottom wing, a Lewis machine-gun on a swiveling mount and four trays of 30-caliber ammunition.

This mighty engine of destruction, when fully loaded, had an absolute ceiling of 5,000 feet. It took half an hour at full throttle to clamber to that dizzy altitude, which it was desirable to attain before crossing the lines. If you crossed at 2,000 feet, the infantry fired at you with rifles and machine guns. Since they couldn't distinguish an English from a German airplane, both sides fired impartially. As our field was only 18 miles from the lines, it was necessary to cruise around on our side for altitude before crossing over.

The FE had a fuel endurance of two and a half hours, so, allowing for head winds and the possibility of getting lost which was easy to do at (*Continued on page* 66)

Strange objects in the air are nothing new to this airline pilot who has seen more than his share in 13,000 hours of flying.

The Flying Saucers I've Seen

By H. A. SHANKLIN

ONE SUNNY AFTERNOON I was flying a DC-3 airliner along the Wichita-Kansas City airway and had just turned north toward Topeka, the next scheduled stop, when I spotted the silver disks. The first flying saucer sped across the nose of the ship going from the right lower part of the windshield to the left-upper corner.

I stiffened in the seat. My hands gripped the control wheel. My eyes, I know, were bulging. At last I had seen one. A flying saucer!

I turned my head slightly to see if the co-pilot had noticed. But he was adjusting the prop controls, so I turned back and waited.

In a moment another disk sailed across in front of us. What was this, I thought, an invasion? I wished desperately for a camera, but in lieu of that, I would study them carefully. There would be no vague descriptions, doubts as to their size and shape and approximate speeds. Coolly I would look them over so as to give the military correct information about these space ships.

Breathing as though I were at 20,000 feet with no oxygen, I stared straight ahead and waited. Two more came into view following the same course as the others. All seemed to be traveling at the same speeds. And I noticed that just before they went out of sight they seemed to pause and then shoot out into space with a terrific burst of speed.

One thing I was certain about now: these mysterious ships belonged to some type of outer space military, for the last saucer had a wing man just to his right and rear, a formation common to our air force. And comparing the space ships with the background terrain, I judged they were about the size of one of our four-engine airliners. Their shapes were the same as reported by other observers: flattened saucers with highly polished metal. Their manner of propulsion puzzled me, for I could see no flames or any whirling parts.

After the two flying in formation had disappeared, I knew it would be best to tell the co-pilot so he could help verify the weird scene. After that I would ring for the hostess so she could corroborate also.

When the next disk came into view, I leaned over to speak with the co-pilot. When I did, the disk disappeared. Somewhat confounded, I straightened up again. The disk reappeared. I sat there moving from side to side, I know the co-pilot thought that I had blown a cylinder, but I was discovering the origin of my flying saucers.

They were caused by the sun reflecting on the farm ponds or tanks that dotted the land below us. I looked down at the little lakes and saw they were silver disks. Their movement across the windshield was caused by the speed of the plane passing over or by them.

I also discovered why the disks seemed to pause near the edge of the windshield and then fade with a burst of speed. It was because I unconsciously moved my head slightly to follow their line of flight. My head movement caused the pause and the speed.

If we had passed over a cloud deck or I had varied our course a few degrees to either side, I never would have discovered that my flying saucers were reflected images of farm ponds below. I would have gone to my grave swearing by all that was holy that I had seen flying saucers. No argument could have torn that idea from my mind. And the strange part of it is that, although I have over 13,000 hours, this was the first time any such combination of sun's rays on water had fooled me.

There is no doubt that I was fooled, for the co-pilot told me later that my face had turned white and my eyes had a glassy look.

Of course, reflection of ground objects in an airplane's windshield is a common occurrence, but usually the airman can recognize the objects. But, once in 13,000 hours, I ran into a combination that duped me completely.

Another windshield reflection so deceived a co-pilot of mine that I honestly believe it caused the lad, who was in his mid-twenties, to have premature gray hair.

We had taken out of Lubbock, Tex., toward Dallas on a gloomy black night. A high overcast blotted out all sky light. Our cruising altitude put us on top of scattered clouds. I was flying and the co-pilot was staring dreamily through the windshield, his head, I presume, filled with visions of buxom blondes.

About 40 minutes out I noticed through the wide breaks in the clouds a grass and brush fire just to the north of our course, on my side. There were two lines of fire, and I realized the ranchers were backfiring to halt the main blaze.

That's all I thought of the fire until we had just passed it. Suddenly the co-pilot reared in his seat and cried, "Look out! Break left!"

Startled, I banked sharply to the left. "Where's the other ship?" I yelled. It's foolish trying to avoid something you can't see. You might zig when you're supposed to zag.

The co-pilot had whirled in his seat and was looking down and back. "It passed right under us," he said, in a strained and quavering voice. (*Continued on page* 54)

The Royal Aircraft Establishment at Farnborough, Hampshire, England, as seen from the airfield.

FARNBOROUGH

Known the world over for brilliant annual air shows, it is older than powered flight itself.

By ROBERT BLACKBURN

PROBABLY NO SPOT ON the face of the earth has been more continuously linked with the development of aviation than the little town of Farnborough, 30 miles southwest of London. Hard by Britain's traditional military training center of Aldershot in Hampshire, Farnborough air ancestry traces back to 1878 when at Woolwich Arsenal in London, an organization was set up to study ballooning. In 1905 this organization transferred to Farnborough where was His Majesty's Balloon Factory.

In 1906 the pioneer aeronaut, S. F. Cody, was appointed to Farnborough as Chief Instructor in Kiting, he having interested the British War Office in his man-lifting kites. Cody had been refused authorization to install power in one of his kite models, but he persevered at Farnborough until permission was forthcoming. On October 5, 1908, he made the first official aircraft flight in Britain in his "British Military Airplane No. 1." Distance covered was 1,488 feet. Still standing at Farnborough is the stump of the old tree to which Cody reputedly tethered his flimsy airplane.

In 1911, Farnborough became the Royal Aircraft Factory with the principal tasks of design, research and test. From its personnel over the years emerged such figures as Sir Geoffrey de Havilland; and from its toil came, as early as World War I, the S.E. 5, an ace fighter of which more than 5,000 were built.

To avoid confusion with the Royal Air Force, which was formed in 1918, the name of the factory was changed to the Royal Aircraft Establishment, and its work was pointed toward pure and basic research—a function comparable to that of the National Advisory Committee for Aeronautics in the United States—rather than toward design and engineering production.

Today, Farnborough (the name embraces the Royal Aircraft Establishment as a whole), employs hundreds of scientists and engineers along with thousands of research workers; and its 12 departments are supplemented by four additional laboratories located elsewhere.

So, when we gather again in September at Farnborough for the annual display of the Society of British Aircraft Manufacturers, let us recall that Farnborough is not so much a "show" site as the heart of Britain's airpower. END

Right: First officially recorded flight in Great Britain is commemorated by this old tree preserved at Farnborough to which Col. S. F. Cody tied his plane.

Below: Flight of Royal Aircraft Factory (now Royal Aircraft Establishment to avoid confusion with the Royal Air Force) planes at Farnborough, 1916.

HANGAR FLYING

EDITOR'S NOTE: *Exchange of flying experience has been historically of high value to the development of American airmanship. Since such exchange is less feasible at modern airports,* FLYING *hopes to project that value through the medium of a monthly section entitled "Hangar Flying." All airmen are invited to contribute to this section as a service to pilots.*

I HAVE HAD OCCASION to see many handsome field diagrams that hang in conspicuous places around airports. They are real purty, but we have the same diagrams in our flight folders, giving field elevation, runway direction, length, and surface, so I seldom used to glance at them. But since a certain Florida take-off, I have never passed one without stopping and memorizing the layout, knowing that I might be saving my life by doing so.

We had led a flight of early model B-24D's into Orlando in the winter of 1942. It was late evening when we came in and, being tired and hungry, I had not noticed much more than the runway I landed on, depending on the tower for taxiing and parking instructions.

Then, in the morning, ground mist was clinging to the tow spots, limiting visibility. When the runup had been completed and the flight was ready to roll, the tower was contacted for take-off instructions. An eager young voice came back over the phones and blunt-nosed '24's moved out toward the designated runway.

For those who had the misfortune to miss flying the early B-24 before they loaded on nose, ball, and tail turrets, it should be explained that the aircraft then was a hummingbird compared to the lumbering dodo it became after the accessories were piled on.

This particular morning we were not loaded heavily. Things looked very cozy as I ran the props through and the co-pilot set the supercharger levers at the desired manifold pressure. When all was ready, I gave the word to the tower, got the eager word back, and a moment later all the needles were pointing at the proper numbers and we were rolling.

There was a slight rise in the middle of the field which together with the morning haze, made it impossible to see the end of the runway clearly. After we were well down our take-off run, the No. 2 engine began barking and I took an eye off the scene ahead to glance at the instruments. By that time we were picking up considerable speed and, in the time stolen for the glance, we cleared the top of the rise in the runway.

When I focussed both eyes back to the runway all thoughts of the recalcitrant engine were dispelled immediately. Looming at us through the mist ahead were the white posts of the fence marking the field boundary and the end of the runway! They were easily seen then because they had for a background the dark green of an orange grove.

There was no time for heroics like cutting the switches and lifting the gear, which is not a recommended procedure for stopping a heavy bomber with a gas load. Brakes were out of the question, the fence being as near as it was. We were committed.

Whether it was the best thing to do or not, I kept the nosewheel barely skimming the runway until the last split second. This avoided presenting more surface to the airflow and assured us of maximum speed in the time that was left. The throttles were full forward and only an idiot would hit sensitive turbo controls in such a situation. He might get manifold pressure galore but he almost certainly would lose a few piston heads in the bargain.

These, however, were things one did or did not do by instinct rather than deliberation. Just before we plowed into the fence, still not having attained anything like proper flying speed and only a matter of seconds after we first saw the fence bearing down on us, I reefed back on the wheel, throwing the ship into the air, and we staggered along in a nose-high position just barely ticking the tops of the orange trees. Once aloft, the speed picked up after the first few unbelievably slow seconds and, in a short while, after fighting the impending stall with rudder and prayer, we were breathing again, and I was calling in the eager young voice in the tower.

After the rest of the flight had been re-routed to a longer runway and a few choice questions had burned the ether between us, the story came out. The tower operator, with little experience of heavy bombardment aircraft, had assigned the runway to take advantage of the slight breeze, and had otherwise gone by the book. If I, on the other hand, had even glanced at the book, I would have known the length—or lack—of runway facing us and could have avoided it or prepared for it accordingly.

"Brakes were out of the question, the fence being as near as it was . . ."

It turned out that we had flown through the top of the fence, had leaves wedged into seams along the belly of the aircraft and had eliminated an auxiliary radio mast someone had stuck up at the end of the runway. I felt very much like offering free kicks to the crew. It is a serious matter to fly from strange fields and not know as much as has been written about the setup.

FRANK TINKER

Toronto, Ont.

RENEWING A MEDICAL CERTIFICATE is not sufficient to "renew" an airman's ability! I had slowly become a dangerous pilot—unaware I could accumulate "rust" in operating an airplane as simple as a Piper *Cub*. A multitude of novices like myself learned to fly on the G-I Bill. We received our Private Pilot certificates and slowly built up a few score hours. Then, amidst the tasks of earning a living, many of us nudged aside our flying aspirations. This caused us to fly only occasionally. The "occasional" flying brought about a gradual and almost imperceptible disintegration of flying abilities.

Recently, after many months without flying, I renewed my medical and drove to the airport to work off some of the "rust." From my friendly operator, I rented a *Cub* and made my first mistake. I didn't insist on a check ride, even though the operator didn't seem to think it was necessary. In the past, I had gone out innumerable times after several months' lapse and shot good landings and take-offs without an iota of trouble.

To begin with, everything went off just dandy. I started around the pattern, making my climbing turns carefully just as before. Then on the down-wind heading, I cut my throttle back, pulled the carburetor heater, and nosed the J-3 gingerly into proper glide speed. There was a stiff breeze blowing down the strip, so I automatically cut into my base leg a little sooner than usual.

When I jabbed the throttle to clear the engine, there wasn't the usual smooth surge of revvs . . . the prop merely twitched to a standstill, straight up imposingly before me! The ship settled onto the end of the runway with practically no margin and presently ran out of taxi momentum. I climbed out and pushed it the last several hundred yards.

When the operator came out and saw his ship being pushed in, we went into a huddle. A quick interrogation brought out the face-reddening disclosure. I had pulled my fuel-valve lever instead of the carburetor heater when I first began my 180-degree approach!

"I didn't insist on a check ride . . ."

Then I dug out my log book to check up exactly when I had last flown. I was genuinely startled to learn that I had not flown for 17 months. Fleeting time had fooled both the operator and me! I suspect it has fooled others who did not live to point out to fellow pilots that a medical certificate is no guarantee against bull-headedness.

JACK PAXTON

Fresno, Calif.

MOST OF MY 1,000 HOURS of solo time have been logged in an *Ercoupe* and, until 1953, I had never been more than 200 miles from my home base. I contemplated and planned a flight from Seattle to Ohio, Tennessee, Alabama, Washington, and New York. Realizing this was quite a hop, I made elaborate plans and took extra precautions. I started to do considerable flying in the Cascade Mountains, learned to use my radio efficiently and pinpoint my positions. I acquired all the necessary charts for the entire trip, made up special flight sheets and studied the route till I knew all the important details.

It never occurred to me that it might become necessary to change my plans and routing, yet I had to do that very thing from the start. However, the hard work was not wasted. It taught me many things.

I had my flight planned from Seattle, via Spokane, Helena, Billings, Bismarck, Fargo and Rockford to Dayton. The morning I planned to leave, a slow drizzle was falling. I would never make it over the Cascades that day.

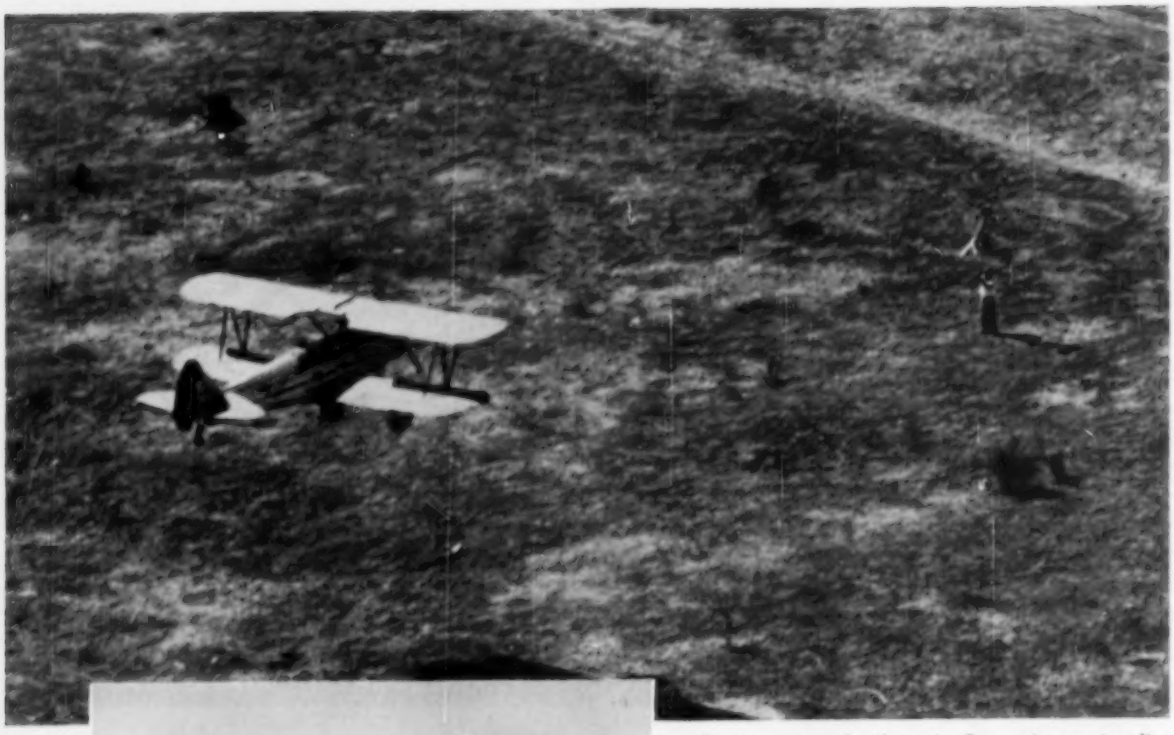
At 11:00 a.m. the rain slacked off; the clouds got higher and began to break up. A light plane came in and informed me that he was from Kelso, and the weather south of Boeing Field was good. He suggested I go down through Portland, up the Columbia River Gorge to Pasco and Spokane. The weather bureau informed me it was VFR to Portland and from there to Billings completely clear.

My charts showed Pasco was right up the Columbia river from Portland. The very simplicity of that leg caused me to make a serious mistake. I had never flown up the Gorge and failed to check the height of the mountains on either side and the narrowness of the pass. I refueled in Portland and, at 2,500 feet, was flying serenely up the river when suddenly the pass began to narrow, the peaks got higher and my plane began to buck and yaw. I tried to gain altitude but instead lost it fast. It took all my effort to keep off the sides of the mountains. It was impossible to turn. I said a prayer and kept going. When I cleared the narrows, I was almost in the water. I made it to Spokane that evening.

My next fueling stop was to be Helena, Mont. After learning considerably more about the mountains from my experience in the Columbia Gorge, I began to take on a lot of altitude out of Spokane. I leveled off at 13,000 feet. That was another mistake as I was so high that I couldn't identify land-marks. At Missoula I had a north cross-wind and picked up the wrong beam out of Drummond until it got too faint. Then I discovered I was headed for Butte. Once I discovered my mistake, it was no problem to follow the Butte range on in. I reached Billings without further incident but got weathered in there.

During my layover in Billings, I met a couple of lady fliers on their way to Lawrence, Mass., to join the women's air race to California. I related my experience in the Columbia Gorge. One of the ladies (*Continued on page 76*)

". . . I asked where the Municipal Airport was located."



Stearman approaches the waving flagman in normal seeding attitude. He then makes a slow, 180° turn, while flagman moves 70 paces to the center of a new 200-ft. seed swath.

GREEN PASTURES AGAIN

In the "battle of the baked rangeland," aerial seeding is salvaging the Southwest's thousands of parched acres.

By LEWIS C. FAY

WE ROCKED ALONG in my Luscombe, with the grim tragedy of the Southwest spread out beneath us, the sun-baked yellow fields and the brown, thirsty-looking brush walking all the way to the horizon, full circle about us. Here and there darker areas told of cleared or plowed ground—where ranchers in desperation had gone through with root plow, chaining bulldozers—anything to disturb the land, to beg the native grasses to return.

"There it is," Lew said. He pointed. A tiny swatch of green clung to the parched ground, like a penny stamp on a patchwork quilt.

I gulped. "That's a landing field?" I demanded, wondering how I could set my plane into anything so small.

Lew grinned. "The boys put their Stearmans in there. You ought to be able to warp this putt-putt in without trouble."

Red goggles are needed to see falling buffel seed

I'd picked up Lew Moore, major-domo for the Gardner brothers, at Crystal City, Tex. He had filled me in on the *why* of aerial seeding of rangeland. I was about to observe the *how*.

Aerial seeding of rangelands, Lew said, is new in the Southwest—new anywhere, for that matter. It's only emerging from the experiment stage. But it's being hailed as a kind of aerial salvation—a method of reclaiming parched pastures where for years no cattle could live. Seeding by air is really only one stage in a program that annually will salvage thousands of acres in the drouth-ravaged Southwest. An earlier stage is the spraying of herbicides to kill out mesquite and other brush, which drains the soil of moisture and denies range grass opportunity to survive. Still another stage involves physical clearing of the land. This is usually done by a process known as "chaining", in which a heavy bull-dozer is attached to each end of a huge chain. The two bull-dozers move on parallel paths, dragging the chain behind them, and breaking off or yanking out by the roots whatever brush lies in its path.

Venturi-type spreader beneath Stearman takes in air at front, blows seed out rear. Marvin Gardner holds blade of feeder power fan.

It's a desperate program now, with tragic overtones. Through many drouth years, southwest ranchers waited and hoped. "Once the rains come, the grass will grow again." They believed this with religious zeal, and scanned the skies hopefully, while the land dried out and cracked and the acreage needed to sustain even one cow grew to frightening figures.

Finally the rains came—good, general, soaking rains—late in the summer of 1953. And there was great rejoicing throughout Texas and other Southwestern areas. Now the native grasses would burgeon, and the long-parched pasture land would again support cattle in vast numbers.

Only it didn't work out that way.

Up and down the Southwest, and especially in south Texas, the ceaseless pounding of the sun through the drouth years had damaged the root structure of the native grasses; nor had enough seed been produced through these years to restore them. When the grass did not return, the land owners slowly realized that the only salvation for their parched pasture was a low-cost reseeding program.

With the cheapest ranch labor on record, it would be difficult to seed an acre of land for less than a dollar or so—and in rolling rangeland, badly cut with draws and ravines, it cost still more. So when Henry and Marvin Gardner, of Crystal City, announced they were ready to spread new seed for 10 to 15 cents per acre, ranchers walked around for a look at the Gardner brothers' Stearmans.

And now, here I was, ready to have a look at the range seeding business.

Suddenly Lew grabbed my arm. Startled, I jammed the throttle forward and yanked into a zoom. Safely back at 500 feet I leveled off, and Lew pointed. There was one of the Stearmans loping above the northeast corner of the grassy field. The pilot was standing up in the rear cockpit, bending far over, peering into a huge seed hopper installed where the front cockpit had once been!

"That's Henry," Lew explained. "The boys haven't figured out any gauge for seed level. The only way they can tell how much they have in the hopper is to lean forward and have a look." The Stearman whipped up on one wing, slid into the grassy plot, and coasted to a standstill.

We parked my Luscombe and I shook hands with Henry Gardner. "Glad to have you with us," he said. "Lucky we got this job today. Now you can see the whole operation, from start to finish."

By modern jet standards, this pilot was a sad sack. His uniform was sweat shirt and khaki pants. The plane looked like something out of FLYING's old barnstorming files. But it wasn't. It was the spearhead of a new "battle of the baked rangeland," a struggle to restore millions of acres to useful production.

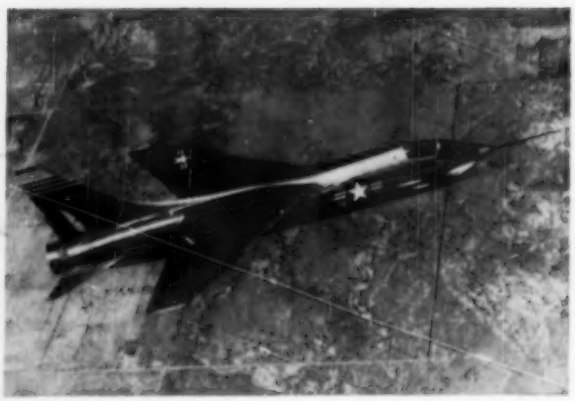
And now the old trainer bumped away across the pasture, gathering speed. It climbed 100 feet, banked sharply, roared across the edge of a newly chained field just east of the landing strip, and lined up above a perspiring flagman vigorously waving a pair of white seed bags lashed to a light pole. Then from a flat, funnel-shaped spreader underneath the plane's lower wing, almost invisible buffel grass seed floated downward and backward, swept into a 200-foot wide swath by the action of the spreader and the downwash from the lower wing.

Marvin Gardner, Henry's younger brother, dropped his plane in a few minutes later, closely followed by Jim Williams flying a seed-hoppered BT-13. Jim is half of Gardner and Williams, another flying outfit, which includes Henry Gardner. With introductions out of the way, and both planes taking on seed and gas, Marvin gave me a rundown on the operation. (*Continued on page* 71)

LOCKHEED TURBO-PROP American Airlines has placed an order with Lockheed for 35 turbo-prop transports. The result of several years research and work by American and Lockheed, the new plane will be in the 410-440 mph class. To be known as the *Electra*, the 64-passenger plane will have a cruising range of 2,000 miles and service ceiling of 30,000 feet. Lockheed's design studies consider use of the Allison 501 engine of 3,750 hp, but final decision on the power plant has not been made and there is a possibility the Rolls-Royce RB-109 may be used. First flights of the *Electra* are scheduled for October, 1957, with first deliveries by August, 1958.

HAVE YOU SEEN?

SMALLEST JET PLANE Below: The French built Payen PA-49 *Katy*, world's smallest jet plane, gets a going over by an interested youngster at the Paris Air Show. Wingspan is just under 17 feet, top speed is 310 mph at 27,880 feet. The Palas powered delta is said to be the forerunner of a VTO interceptor.

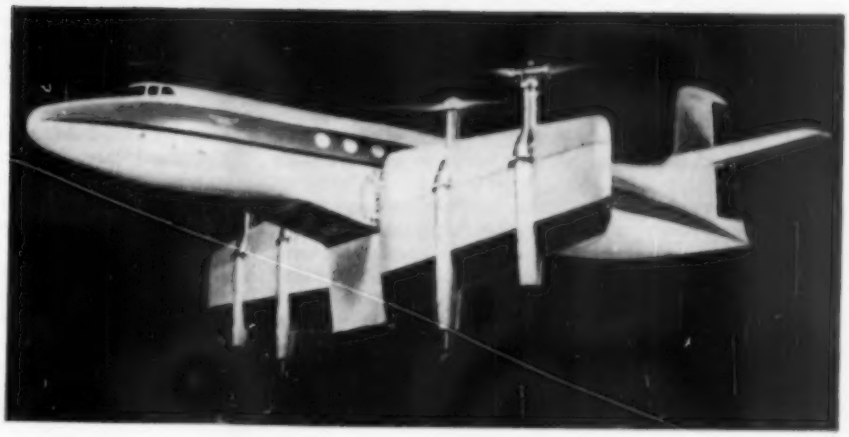


XF8U-1 Above: Navy's newest jet fighter, the Chance Vought XF8U-1 is designed to operate from aircraft carriers at supersonic speeds. The slender, sweptwing fighter marks a substantial departure from previous Chance Vought fighters. Set well back from the cockpit, the thin wing is mounted high on the fuselage and the horizontal tail is joined low on the fuselage. Titanium was employed in the light weight airframe. The plane is now undergoing test flights at Edwards AFB, California.

EXECUTIVE HERON Right: As plush airplanes go, the de Havilland *Heron Executive Special* is exceptionally luxurious. The new version is a Series 2 with an entirely new interior furnishing scheme designed for up to six passengers, rather than the original eight seat layout. Provision is made for sitting, sleeping, eating and drinking in comfort. The main cabin is divided into two compartments, the forward one fitted as a lounge with a long upholstered couch. The rear compartment contains four armchairs, arranged in facing pairs with folding tables between.

MS 760 Left: Now on exhibition tour of the United States under the sponsorship of Beech Aircraft Corp., the French Morane-Saulnier 760 *Paris* is a four-place, twin-jet, pressurized plane with a high speed of 410 mph. When powered by two Continental J69 versions of the Turbomeca Marbore II engine, the MS 760 has a maximum range of 1,015 miles at 23,000 feet, 20,000 rpm and 303 mph. Absolute ceiling, two engines, is 37,000 feet; one engine, 10,000 feet. Take-off distance is 2,400 ft, or 3,400 feet over a 50 foot obstacle. Landing distance is 1,850 feet, or 3,050 feet over a 50 foot obstacle. Rate of climb on two engines at sea level is 2,485 fpm. Gross weight is 7,480 lbs. Present price of the executive jet plane is in the neighborhood of $300,000.

VTO LINER Right: Able to take off and land vertically like a helicopter, this laboratory scale test model, designed and built by the National Advisory Committee for Aeronautics, uses the downward jet of air principle, with wings moving up into a horizontal position for normal flight. Model has been test flown at NACA's Ames Aeronautical Laboratory, Moffett Field, Calif.



1

1
Image tower located on top of base operations at Atsugi, Tokyo Airdrome. Spy glasses were used by the curious to watch incoming planes and arrival of VIP's.

2
USAF radio receiver plane sets up operations in the ruins of a Japanese hangar.

3
Gen. Douglas MacArthur, smoking his ever-present corncob, surveys the situation upon his arrival at Atsugi Airfield, Japan, August 30, 1945.

2

Invading the Japanese homeland

for the first time

In a thousand years . . .

By DICK LACOSTE

3

NOT FOR MORE THAN a thousand years had an enemy occupied Japan's homeland when on August 28, 1945, just ten years ago, "Crash Project No. 1," led by a Douglas C-54, glided into Atsugi Airfield, 18 miles south of Tokyo. The hour was 8:28 a.m. Tokyo time.

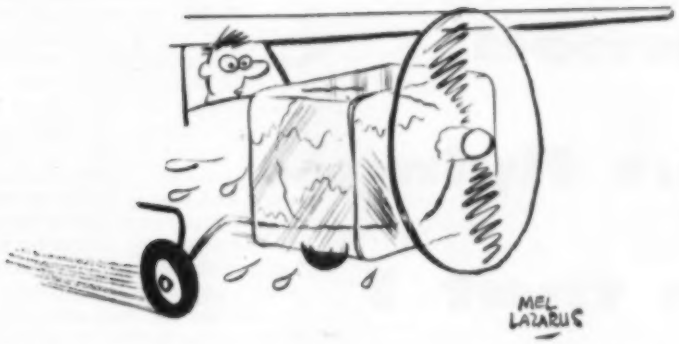
"Crash Project No. 1" was an advance echelon of 11 U. S. Army Air Force transports bearing 150 communications technicians whose job it was to set up air traffic procedures and radio contacts for the arrival of General MacArthur and his occupation forces. Symbolic of the place of airpower in military operations, the first vehicle to roll from the belly of the first C-54 to land was a jeep-mounted Air Control Tower. Swiftly it ran to the end of the runway at Atsugi and was handling traffic before the last of the transports was ready to land. Within an hour, the technicians had an emergency homing beacon functioning and the four transports which contained the power units and transmitting apparatus were in contact with Okinawa.

Following swiftly on the heels of the communications experts came the vanguard of the Occupation Army—plane after plane of them discharging their troops and getting airborne again within a scant 20 minutes per plane Japanese guards, armed now only with clubs, were astonished at the speed with which the airport, literally knee deep in dust, was turned into a port of debarkation.

How different it all was from the invasion scene which had been expected to eventuate—amphibious forces storming ashore under a rain of fire from Japanese batteries—fighter-bombers of the Army Air Force and Navy working over intrenched Japanese defenses—the big rifles of the battleships throwing their hail of high explosive against fortifications. This had been the pattern of action at the Normandy beaches and in North Africa, and Italy, and at Guadalcanal and Tarawa and a score of Pacific Islands, where American forces took heavy losses and the enemy endured practical extinction.

And now here was an invasion spearheaded by a handful of transport aircraft and a cadre of electricians. The several million men, Americans and Japanese, who had been expected to die in the conquest of the Japanese homeland were still alive. Scant wonder that around Atsugi, and down at Okinawa, and on troop transports plowing the Pacific with veterans of European campaigns, the postponement of death on the beaches was almost unbelievable. Probably in all military history no anti-climax to the conclusion of a great war has ever paralleled the actual events at Atsugi on August 28, '45. Surely the fate of Hiroshima and Nagasaki was sad to both victor and vanquished but therein lay the end of a conflict and the saving of incalculable life. But what then? In the light of history, the handful of transports at Atsugi appears an inscrutable scene for the Gods themselves. END

THE PRO'S NEST



ANY ICE TODAY?

There is more to the business of carburetor ice and adjusting a rough-running engine than just pulling out the carburetor heat control button.

By JOHN R. HOYT

SUPPOSE YOU AND I are cruising at 5,000 feet above rough terrain. Our one and only engine becomes rough and skips a beat; something inside us skips two beats. We glance at the ground in hope of finding a field. . . .

But perhaps we have cockpit trouble which can be corrected. Take for example Pilot A, an experienced aviator who knows how to analyze a similar situation: realizing that the temperature is below 70 degrees and that carburetor icing may occur even when there is no moisture present in visible form, he applies carburetor heat. The engine is rougher with heat *on* than with heat off! What will he do next to solve the problem?

Or take Pilot B, another smart pilot: Pilot B was cruising his lightplane under conditions very favorable to carburetor icing When his engine suddenly began to run rough he applied full carburetor heat, but only *intermittently*. Why?

There is evidently more to the problem of rough engines and carburetor icing than can be told in a few words. What should we know about engine operation that will help us to increase our ability to fly safely?

In this discussion we must assume that we are not flying a plush job equipped with a manifold-temperature gauge, a fuel-air-ratio analyzer, a manifold-pressure gauge, and other expensive instruments. We have a light plane with a "basic" panel, and we must use our sense perception to analyze trouble and fly the plane efficiently. There is not even an "easy rule" which can be formulated because the two situations, used as examples, require knowledge, experience, and ability to "shoot" trouble by hearing, seeing, and feeling what is going on.

What we must know is the essential information used by Pilot A and Pilot B. As readers of "Why Ice?" in the December, 1954, issue of FLYING observed, ice in the carburetor venturi closes the passage, permits less air to enter, and richens the mixture. Therefore two steps are possible: (1) to apply carburetor heat and melt the ice, or (2) to lean out the mixture. But Step 2 merely alleviates the trouble temporarily, and it accentuates the difficulty a few minutes later because more ice forms, the roughness increases, and (because less power and heat is being developed) the additional ice will be harder to melt. What is worse, with more ice, more water goes into the cylinders when carburetor heat is applied later!

Therefore, when Pilot A felt and heard the roughness develop in his engine, he correctly applied carburetor heat first. Then he observed his tachometer. If he had carburetor ice and a resultant rich mixture, the application of heat should have melted the ice and increased the rpm's, partially at first and fully after heat was removed. When the engine remained rough, ice was eliminated as the source of trouble, so Step 2 was in order: he leaned out the mixture control, listened to his engine, and watched the tachometer; gradually the engine smoothed out, the rpm's increased, and he picked up a few knots airspeed.

Please note that when Pilot A solved his immediate problem of a rough engine by first applying heat and then leaning out his mixture, it did not preclude the possibility of carburetor ice later—he still had to keep checking for ice under his existing weather conditions by using heat at intervals.

The confusing factor in the case of Pilot A was that he was flying at 5,000 feet! Ordinarily a modern carburetor does not need mixture control adjustment below 5,000 feet, but in this case the impossible happened (as it usually does) and the mixture was too rich with the mixture control at normal (sea level) (*Continued on page* 72)

NO. 187

I learned about flying from that !

The Seabee hit a solid wall of water with a terrific impact. That was when shoulder harness proved a godsend.

By LUCIUS E. BURCH, JR.

THIS IS A STORY OF AN avoidable crash. It is told, not to illustrate the faults that brought it about, but rather, a correct procedure that prevented it from being serious.

For the past several years, in February, it has been my custom to take the back seat out of my old Cessna 170, put in a friend and three or four bird dogs, and go to Cuba. Sometimes I go direct but when I have more time, I go down the Mexican side of the Gulf, shoot quail on the way, and then cross over the Yucatan Channel to Cuba from the Island of Cozumel. This past February, quail shooting in Cuba was magnificent, as always; in addition, we got in some wonderful bass fishing in the Zapata Swamp. In the course of this fishing, the natives spoke of a big lake in the Swamp, completely inaccessible and populated with bass up to 20 pounds, crocodiles (not alligators), and fresh water tarpon. I decided to fly down into the Swamp and see the lake. There it was, exactly as described. Several large crocodiles were plainly visible from the air. This, coupled with the wonderful fishing we had had in the smaller lakes, made me resolve to get back into that lake. About two weeks after returning home, I was able to purchase a *Seabee* in excellent condition and for very little money.

Since everyone gives the *Seabee* a bad name, which, in my opinion, is quite unjustified, I was very careful to get a good amphibian course from a qualified instructor. In April of this year, I headed south for the lake in the *Seabee*.

I was to deliver a Cessna 170 to a friend in Cuba, which was piloted by George Grider, wartime skipper of the submarine *Flasher*. He was accompanied by a friend, Harrison Humphreys, who was going with me into the lake. We left Memphis right at dawn, they in the Cessna and I alone with 80 gallons of gas aboard the *Seabee*. With only one stop necessary in Tallahassee, and by going direct from Tampa to Key West, the old *Seabee* was on the ground nearly an hour ahead of the faster plane. Next morning, we were off bright and early. By nine o'clock we had cleared Havana Customs.

In Havana we transferred all of our baggage to the Cessna and sent it on to Varadero with Grider. Humphreys and I headed southeastward for Zapata Swamp. In an hour, we were over the lake. Uncertain as to the size of the lake, its depth, and the presence of shoals, we purposely carried as little gas as possible. It was a magnificent day's fishing. We released 200 bass and kept only eight or ten viaheа, which are exceptionally good eating.

At five o'clock in the afternoon, we got aboard the *Seabee* for the trip to Varadero. We left our collapsible boat as a mooring buoy and put all of our precious tackle in the boat, expecting to return the next day. We were off the lake after a very short run. Another 30 or 40 gallons of gas wouldn't have caused us the slightest concern. At the time we took off, the gauge showed 20 gallons and it was 90 miles to Varadero. This seemed a tight fit, but not alarming, as a large part of the course was over Cardenas Bay.

Varadero Beach is a spit running eight or ten miles northeast-southwest with Cardenas Bay on one side and the ocean on the other. As we approached Varadero, the gauge showed about five gallons so we began to lose altitude. We got down over the beach to see the sights as we approached the airport. Going downwind, I put the prop in flat pitch and cranked down the wheels. Then, just as I started to turn on base leg, the engine quit without a single sputter. There was no place to go except in the drink. A northeast wind of 30 knots blew right on our tail; large whitecaps were all over the sea. As a *Seabee* lands at about 80 mph, the thought of putting it down on a rough sea, downwind, at 110 mph was uninviting. I immediately put it into a hard turn, pumping the hydraulic system frantically all the time and hoped for the best.

I remembered reading in the Service Manual that, in the event of a forced landing, it was necessary to pump the wheels back only three or four strokes. Thereafter, they would fold on impact. So, after hitting the pump a few licks, I switched the lever and went to work on the flaps. I was just about to get the flaps down when I came out of the turn and flared out over the sea into the wind, feeling pretty satisfied with myself and expecting nothing worse than a rough landing. My next sensation was seeing an enormous wave towering up, then a tremendous crash, followed instantly by finding myself under water. After some rather rapid unbuckling, I swam out the side and came (*Continued on page* 70)

Icy Nerves

Getting in and out of a big city on a holiday weekend, of course, calls for icy nerves and a steady hand. Traffic on the George Washington Bridge, from New York City to New Jersey, soars from its daily average of 85,000 cars to as much as 134,000 and jams have developed on Route 17, the feeder line, as far as Monticello, New York, 84 miles from the bridge. C. McKim Norton, vice president of New York City's Regional Plan Association, predicts by 1970 it will take an overnight trip to reach the open countryside. Within 15 years, he said, the New York metropolitan area will be a continous tight packed section extending 40 miles north of Manhattan and 70 miles east and west.

Excerpted from a Wall Street Journal story of June 21, 1955.

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African Apache

(Continued from page 21)

American gallon, someone was apt to come up with a wrong amount. We normally didn't bother to figure costs. This may not have been too intelligent. Upon getting the bill from Natal, we found we had paid 78 cents per gallon for 80 octane, and 52 cents per gallon for 100 octane! We could have saved $34.54 by using only the higher octane. The exorbitant price of the 80 octane was evidently due to dispensing by hand instead of by truck.

To those of us accustomed to flying in the northeastern United States, the weather on this entire flight, except for periods over the Atlantic, could not be considered less than ideal—CAVU almost entirely. We spent considerable effort in South Africa trying to convince local pilots that weather and terrain in Pennsylvania are much more difficult than in their country.

Africa, south of the Equator, has a dry season from March until September, and weather, especially in South Africa, resembles that of Arizona in winter. Most of our course south of Leopoldville was over a high, relatively flat plateau, with some areas cut by shallow wooded valleys or covered with brush, but much of the country is grassy plains. The plateau is from 3,000 to 5,000 feet in elevation, and near Pretoria the terrain, as well as the weather, seems similar to that of our southwest just east of the Rockies. Expecting that Africa would be one huge mass of steaming jungle, mosquitoes, wild life and questionable skies, we had planned our flights over traveled routes and along a railroad that runs from Leopoldville to Pretoria. Actual conditions, as we found them, were so easy that we toured around pretty much as we pleased. Only a very few miles of our Africa flying were over jungle, and 2,000 miles of it was down a beach that appeared far nicer than any beach in this country.

We were advised to do most of our flying before 2 p.m to avoid afternoon thunderstorms. This is of course good advice, yet we saw only one storm over Africa which commanded real respect, and could have flown until dark of each day. Apparently there are extremely powerful and extensive build-ups here at times, more hazardous than our summertime storms, but clearly enough defined so that they usually can be avoided.

We were particularly concerned with insect life because we were taking movies through the windshield, which we didn't want smeared with the remains of grasshoppers, beetles, and their friends. Either the insects on our course were much less numerous than in the United States, or they were more artful dodgers, because we hit very few of them. Even mosquitoes were nearly non-existent, and despite lack of screens at various stops, we received only a few bites apiece during the whole trip.

The South Atlantic crossing provided the only challenge of the trip, and it wouldn't have amounted to much except for a few elements of the unknown and unexpected in the weather situation. At Natal, we were able to obtain no more than a rough forecast, which appeared about as reliable and informative as a general description of the route weather obtained months earlier from Pan American.

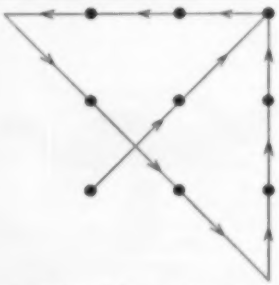
The flight from Natal, Brazil, to Roberts Field, Liberia, is east northeast, from a point 6 degrees south of the equator to a point 6 degrees north, entirely over water except for one dot of an island called Fernando de Noronha, 240 miles from Natal. This island, which has an inactive airport and a radio beacon, makes an excellent point at which to check one's initial navigational heading, and ground speed. We selected late afternoon as the most desirable take-off time because our African destination would then be reached in mid-morning, after early fog would have dissipated and before afternoon thunderstorms had built up.

The equatorial front, a stationary phenomenon usually of moderate intensity and extent, almost always lies across this route, and this time of year was supposed to be fairly close in to South America. Taking off at 1630 local time should put us near the front about dark, with a relatively clear route for most of the night. At 1830, what appeared to be the front was approached and the next few hours were spent either in, or dodging good sized cloud formations at our altitude of 9,000 feet. Turbulence was generally mild, except for occasional jolts which caused a little speculation as to how securely the extra fuel tanks were anchored down.

According to available information, the front should have been behind us by 2130, and this seemed to be the case. Through most of the night, we held very closely to a magnetic heading of 90 degrees, true heading 69 degrees, which allowed for a 3 degree drift due to easterly winds. A weak half-moon came up about 2300, more clearly defining a number of impressive neo-nimbuses, which we skirted. After looking forward all night to sunrise at 4:30, it was disappointing not to have a genuine dawn, but to be faced with a grey-black wall across the course, extending down to the water.

Paralleling this mass for a few miles in an east southeast direction accomplished nothing. Knowing we couldn't afford to deviate from course very long, we let down to 500 feet and turned due north in an attempt to fly under the front on a

(Continued on page 52)



EDITORIAL ANSWER

Solution to the problem posed in the Editorial on page 18. The trick is to go beyond the perimeters.

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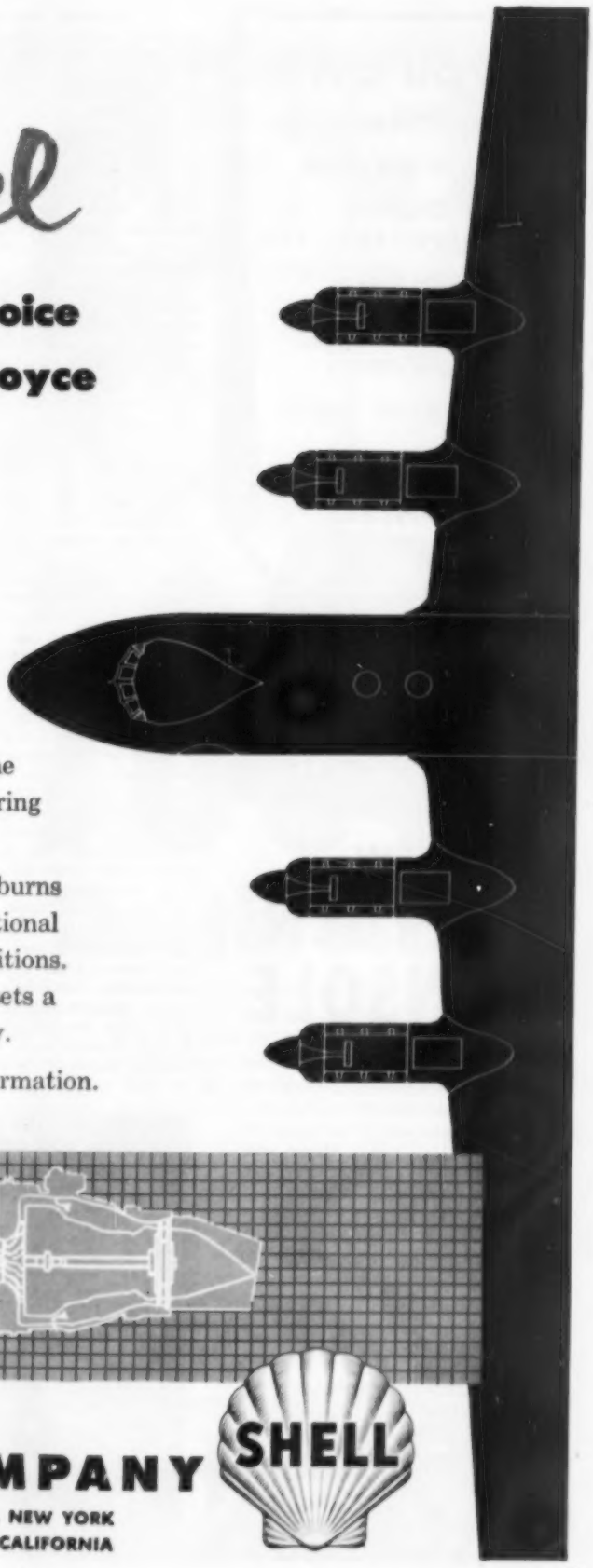

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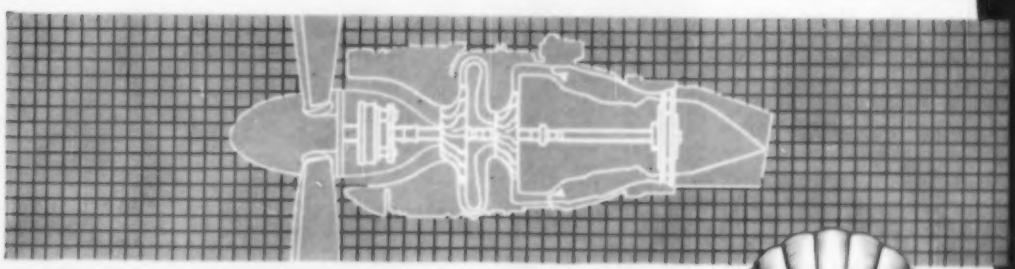

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(Continued from page 50)

line perpendicular to it, to make the passage through as quickly as possible. Evidently we had either just reached the real, equatorial front, or there were two frontal systems on the course at this time. It became obvious there was no chance of flying under this watery wall, so we ploughed into it at 1,500 feet and for a couple of hours bounced from deluge to deluge. Having been aloft 14 hours, we figured on being close to our destination, and the possibility struck us that Roberts Field might be covered with one of these zero-zero areas. With tremendous static on the radio, we weren't able to communicate with Roberts to obtain local weather and our ADF cross bearings were not reliable enough for a good fix. In any event, we finally broke out of the front about an hour off the Liberian coast and at 0830 Natal time, sighted Africa. It wasn't such a relief as you might expect. We knew it was there, all the time.

The survey we made of the potential recreational use of airplanes like the *Apache* for extended trips was continued through Africa, although obviously not many persons will travel so far by personal plane in the near future. Facilities on the route we followed through Africa particularly until we reached Leopoldville, do not tend to encourage personal plane travel. In the Congo we had some very comfortable and interesting stopovers. Victoria Falls, in Southern Rhodesia, undoubtedly made more of an impression on us than any other resort we have seen in any part of the world. Care has been taken to keep the falls area in its natural state so that a person almost feels he is the original white discoverer. No precautions are taken to keep the public back from the various brinks or from plunging 300 feet into the boiling torrent of the Zambezi in its narrow gorges below the falls. Spray plumes several hundred feet above the canyon and creates a cloud which can be used as a landmark within a radius of 50 miles.

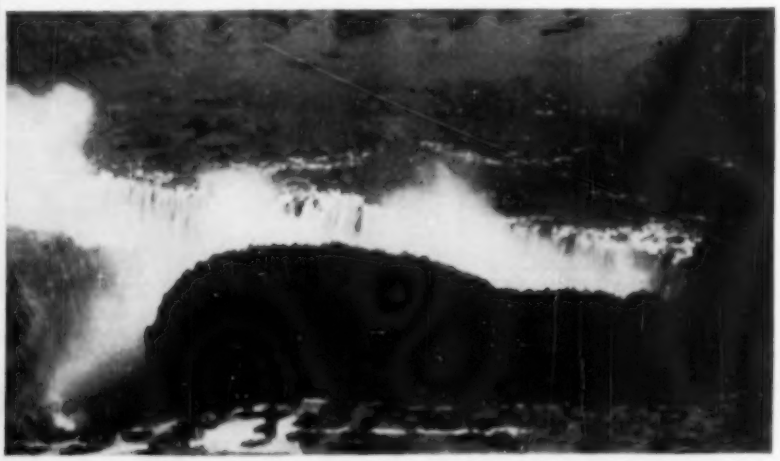
The Victoria Falls Hotel, only a short walk from the falls, is operated by the British Government with the help of several hundred native employees. It provides a level of luxury hard to match. A modern room, three teas per day (!), and lavish meals, for $6.50 per day per person, make Victoria a place one leaves reluctantly.

While African resorts are distinctly out of the question for most U. S. travelers, there are dozens of other heretofore relatively inaccessible spots, such as the smaller West Indies islands, which can now be reached easily by the *Apache*. Our feeling is that airplanes in this class will eventually make vacation travel to these places quite commonplace, and that this type of pleasure flying in time will appreciably expand the market for such airplanes.

Single engine planes are operated constantly between many of the West Indies islands but there is just too much water in that part of the world to make single engine flying unreservedly qualmless, even for experienced pilots.

While our survey of airplane business potential on this trip was not nearly so comprehensive as our recreational travel survey, it was clearly evident that personal airplane travel has a sure destiny throughout the parts of the world we covered, and that multi-engined aircraft are particularly desirable. What is not clear is how economic conditions in various countries will permit rapid promotion of airway facilities and procurement of suitable airplanes. In almost all countries on this route, the commonly used personal and business aircraft are U. S. made, with very little competition from European or other manufacturers. In South Africa, for example, approximately 90 per cent of the personal and business fleet is U. S. produced. Over 400 planes have been sold in South Africa by Piper distributors alone, since 1946.

In retrospect, our ferry flight proved less an adventure and more an indoctrination into market possibilities. Far travel does not necessarily mean difficult travel. The trip left my brother and myself with a feeling of satisfaction that our craft was a contribution of note to the evolving air age. And who can say that the intangibles of this airplane business are not a major reward of those engaged in it. END



Victoria Falls, Southern Rhodesia, as viewed from the *Apache* at 1,000 feet.

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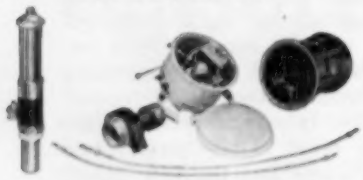

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Joe

Janitrol Aircraft-Automotive Division,
Surface Combustion Corporation,
Columbus 16, Ohio.

The Flying Saucers I've Seen

(Continued from page 38)

"What passed?" I asked.

"A round saucer with flames shooting out of its sides," he said, his own eyes about as big as saucers.

"I'm glad it was round," I told him. "I'd sure hate to meet a square saucer."

What had happened was that his windshield had not been reflecting anything because of the dark landscape and the scattered clouds. Then, all at once, it picked up the two wavering lines of brush fire. To this day he firmly believes we were nearly rammed by a jet propelled saucer spitting flames from its sides.

Scanning the skies to an airman is a means of survival. A pilot is like a motorist forever approaching an intersection. Always you look to the left and the right, up and down, sideways. And you don't fly very long before you realize that your eyes, viewing things against the immense backdrop of sky, are unreliable.

Light rays reflected from wisps of clouds, dust layers aloft, and layers of warm air with high moisture content, make you see things that aren't there. Your eyes record the illusions honestly; your imagination gives them substance. For example the disks over the Sangre de Cristo mountains of northern New Mexico have been giving my imagination a workout for the past ten years. On the route from Dallas to Denver our course angles us near this range in the vicinity of southern Colorado. One afternoon, there were, lenticular, lens-shaped clouds over these mountains and the air contained much moisture content in the lower levels, when I saw silvery disks fluttering southward at high rates of speed.

I quit breathing. These were space ships sent to watch our atomic installations in New Mexico. I picked up the mike with the thought of warning our company radio operator about the visitors; but just then, from the corner of my eye, I saw a silvery flash from the base of a high lenticular cloud. Then another. I put down the mike. Now for the past years, when the moisture content of the air seems to be right, I've watched the disks fluttering over the Sangre de Cristo mountains. Always heading southward, always going at terrific speeds.

I have tried to put port holes around them, jet exhausts and identification marks. Sometimes I succeed in installing accessories on the flying disks, especially when my side window is dusty, or I am very tired.

One evening in this same vicinity, my heart was nearly jarred from its mounts by an awesome sight high in the sky . . . a red disk traveling eastward at a steady clip. The co-pilot and I rubbed our eyes and muttered to ourselves. It was many minutes before we realized it was a translucent balloon catching the rays of the sun which had settled behind the mountains. We knew the jet stream was in that area so that explained its speed. But to show how unreliable are eyes when looking at an object which has no background, we could make ourselves believe it traveled thousands of miles an hour, while a minute later we were convinced it was not moving. Yet it must have been moving at a constant rate of speed.

You can look in the sky and see things that aren't there, but what the ordinary person does not realize are the many material things actually in the sky.

The air above the States is filled with our jet planes on routine and training flights. And because these jets use too much fuel below 20,000 feet, they make their home miles above the ground.

I don't say there are no flying saucers, either Earth or Mars made; I've just never seen one. But I do know there are many things in the sky that look like flying saucers and are not. END

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TAC

(Continued from page 26)

dozen TAC Douglas C-124 *Globemasters*, each capable of carrying 200 combat troops took off for France to pick up the troops. Then off to French Indo-China, where the troops were landed a short time later. The C-124's were back in the U. S. within the week.

A current TAC operation is airhauling equipment to the rim of the Arctic. This is in support of the northern DEW Line (distant early warning radar network). Recently the 18th airlifted 6,600 tons of tractors, buildings, and other heavy equipment needed in construction of the DEW Line. In initial phases of this Arctic airlift, the C-124's made landings on snow-covered airstrips in temperatures as low as 57 degrees below zero.

The transport chores of TAC are officially distinguished from those of the Military Air Transport Service (MATS) in this fashion: TAC's work is designed to provide airlift *within* a combat zone, whereas MATS generally supplies lift generated *outside* of the theater. Of course, there may be overlapping, geographically speaking, but in this day of requisite mobility and flexibility, the Air Force still has a long way to go to attain its desired logistical potential.

Principal planes current in TAC's airlift include the Fairchild C-119, a medium troop carrier used in paradrops; the Douglas C-124, biggest transport currently in operational use; and Sikorsky H-19 and Piasecki H-21 troop-carrying helicopters. With more advanced transports on the way, TAC's future in this field is bright. Forthcoming types will be powered by turbo-prop engines and include:

● Lockheed C-130—This plane, which can carry twice the payload of the C-119, will be driven by four turbo-prop engines at a speed of more than 400 mph. It will be delivered to TAC shortly.

● Douglas C-132—This is a massive transport in early development stages, designed to carry a payload of more than 50 tons. The prototype is not yet completed so the C-132 is some distance off.

● Douglas C-133—This turbo-prop carrier is based on the C-124 and capable of hauling more than 25 tons at high speed.

In addition to these turbo-props, TAC will soon receive Fairchild C-123B assault transports. These twin-engine, reciprocating transports, originally designed by Chase Aircraft Co., are noted for their short takeoff and landing capability. They will particularly benefit Army requirements.

More than any other Air Force command, TAC works hand in hand with Army and Navy. It constantly holds joint maneuvers and special missions under field conditions with the surface military services. One of the chief outlets for inter-service discussion is provided by TAC's Air-Ground Operations School at Southern Pines, N. C. Here Army, Navy, Marine, Air Force, and NATO commanders and staff officers study to better understand joint doctrines and techniques.

With all of its responsibilities, it is scant wonder that TAC is at last receiving top consideration in all military planning. Under the Pentagon's "new look" in preparation for the "long pull," TAC wings will be increased to 49 out of an overall 137 wing Air Force scheduled by mid-1957. TAC now has 38 wings.

"This buildup of tactical air strength will furnish a better balance to our nation's air power, and enable us to meet our commitments to NATO," General Weyland said. "It also means that we will be ready, not only for major emergency, but for periphery wars as well."

END

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Stranger Than Fiction

(Continued from page 27)

of Kent similarly failed to reveal a trace of the Nazi. His case is another that remains an open book on War Office files, for the Secret Service is convinced that the pilot was not drowned at sea, but that he landed somewhere in Sussex and somehow escaped detection. Where he went ultimately—and how he got there—is the question they want answered.

NEAR THE VILLAGE of Eyke, in the vicinity of Woodbridge, one night in 1940, a German seaplane became the war's strangest victim. The seaplane had been on a mine-laying expedition, but somehow went over 200 miles off course and paid the local vicar a visit—for it landed in the vicar's garden. A mine it had been carrying exploded when the plane crashed, killing both pilot and navigator. Royal Air Force officers examined the plane but were unable to find the cause of the crash or the reason for the plane being so far off course. Only when a local police doctor decided to re-examine the pilot's body did the cause of the crash enter official records. The pilot had been shot in the back of the head with a .32 Walther pistol. His identity and that of his navigator was established. In each man's pocket an identical photograph of the same girl was found.

FLIGHT-LIEUTENANT Jacobus Oosthuysen, 27, of the South African Air Force, was seconded to the Royal Air Force early in 1940 as a fighter pilot. In April of the same year he was engaged in combat with two German fighters over London when his engine cut out. Spinning earthwards, Oosthuysen prepared to bail out. He was 2,000 feet up when he felt an unseen power force his hand to the stick. Although he knew it was futile to do anything other than get out fast, he could not stop his hand from pulling back on the control. The plane shuddered—the nose came up and the engine roared into life for no reason whatever. The *Hurricane* was climbing steeply and immediately in front of it, a perfect target, was one of the enemy fighters. Oosthuysen gave him a burst of gunfire which sent the plane down in flames.

Later the South African told his commanding officer about the uncanny experience.

When Oosthuysen finished the story, his Group Captain said: "The last man to fly that plane was Sergeant W. He had an identical experience. He said that his engine cut, but that he felt something move his hand to the controls and pull the plane's nose up. I thought Sgt. W. was pulling my leg when he told me that a dead engine came to life.

"Chap who piloted that plane originally was an Irishman. Spent hours working on it when he was off duty. Loved it like a baby; always tinkering on the engine. He said once the engine went dead and he was less than 1,000 feet up when, for no reason whatever, it came to life. The Irishman was killed four months ago—flying another plane because his ship was in for overhaul. Sgt. W. was killed six weeks ago—flying another plane because this one was in for overhaul."

Twelve days later Oosthuysen died in combat—flying another plane because the *Hurricane* with the strange engine was in for overhaul.

A FEW MINUTES after midnight of February 24, 1944, a force of Luftwaffe bombers was directed against London. A Dornier was engaged by a *Spitfire* and badly shot up before the tailgunner hit the "Spit" with a burst of fire. Dick Compton, piloting the *Spitfire*, was unable to extricate himself from the pilot's seat. Jammed in, he dug out a screwdriver while flames licked around him. Frenziedly, he dug his way free and, at the last moment, cleared the plane, his flying suit in flames.

He tugged the ripcord but, before he felt the jerk of the harness, his body hit water. He went under but struggled to the surface, trying to free himself of the parachute. As he straightened, he felt his feet touch bottom. Unable to believe his luck, he inched forward in the inky dark, hands outstretched and feeling every inch of the way with his boots until he came to the shore, to find police and Home Guard hurrying towards him across an English meadow. He had landed in the middle of a ten-foot wide creek, barely three feet deep! END

WHERE AM I?

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Turbulence

(Continued from page 23)

content appears in the form of clouds. This is indicative of the presence of convective type turbulence.

Clear air not associated with clouds can also be divided into stable and unstable air—the more unstable the air, the greater the turbulence intensity.

Considering the cloudy sky, let's look at the solid overcast often caused by stratus clouds. This condition is indicative of a stable atmosphere and, since the layer of clouds itself shows a lack of vertical air movement, we expect little turbulence from this condition. Cumuliform clouds, from the small fair weather puffs to the well developed cumulus discernible on a radar scope, offer the most concentrated turbulence normally encountered in operational flying.

The presentation of a cloud on a radar scope is made possible by water droplets contained in the cloud; and further, it has been shown that there is a definite correlation between the radar echo and the turbulence field. Heaviest turbulence in a thunderstorm exists in the portion of the cloud giving the brightest radar return. Fortunately, considerable work has been done utilizing radar as a means to avoid this worst turbulence.

We now need a suitable method to compare the amount of turbulence for these various conditions. For lack of a better measure, a value called "effective gust velocity" (a measure of turbulence by airplane reactions) has been used to evaluate the turbulence encountered when flying. To visualize the meaning of different values of effective gust velocities would be difficult for a person not acquainted with flying. Recorded effective gust velocities run from two or three feet per second, where they are seldom discernible from engine vibrations, to 40-45 fps gusts. On one thunderstorm penetration by a fighter aircraft, a large gust upset the aircraft so badly the pilot thought he had a mid-air collision with another plane. Pilots flying clear air on a warm afternoon at about 1,000 feet above the surface will often encounter choppy air caused by surface heating. These gusts normally run about eight to ten fps. The sharp turbulence encountered at low altitude on windy days may run as high as 20 fps.

Although we know "bumps" occur at low altitudes over cities, plowed fields, etc., we may assume that the gusts occur in a random manner. On this assumption we may calculate how far an airplane would have to travel in a certain type of air to encounter a gust of a certain size. *Fig. 1* shows the number of miles of flight necessary to exceed a given gust velocity for several operating conditions for which data are available.

The information is plotted on a linear vertical scale, and a logarithmic horizontal scale. It will be noted that the closer the line to the upper left corner, the greater the turbulence. On a course through a thunderstorm having a radar echo, in 100 miles of flight, one could expect one gust as high as 30 fps. However, in flying 100 miles of cumulus clouds, not

having radar echoes, a maximum gust of 18 fps would be expected.

Since we cannot eliminate it, the next best thing is to fly in weather conditions where we will encounter as little turbulence as possible. For airline and military operations, even this is not feasible at times.

Occasions do arise where a line of thunderstorms is confronted in a manner to make circumnavigation impossible. In lightplanes a 180 should be made, followed by a landing. However, caution must be exercised when landing if there is thunderstorm activity in the area. When rain appears on the surface, it is generally accompanied, and sometimes preceded, by a mass of cool air that spreads out over the surface. This mass is generally of higher velocity and from a different direction than the wind in the

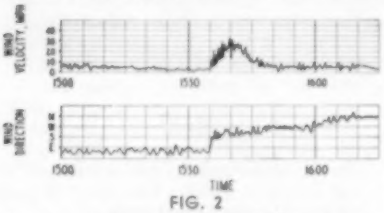

FIG. 2

local area it enters. *Fig. 2* shows a recording of velocity and direction made during the occurrence of such a wind. It can be easily seen that a lightplane would have troubles if it were on final approach and was overtaken by this "gust."

If penetration of a storm is to be made, the pilot should pick the softest part possible and handle the aircraft in a manner not to aggravate gust loads. Safest method for locating a soft spot is to choose the proper altitude. Turbulence is lighter in either an air mass or a frontal type thunderstorm at altitudes below 10,000 feet. If these altitudes can be safely flown, a certain amount of turbulence can be avoided. Since shock is directly proportional to the speed of the plane encountering the gust, the aircraft should be flown at lowest practical speed—not slow enough, however, to lose control.

Data have shown that greatest accelerations are normally received upon entry into the cloud. This is due in part to pilot reaction. At this time an aircraft receives heavy acceleration, the pilot is tense and often over-controls. If the pilot recognizes that he will hit rain, lightning and turbulence and mentally prepares himself, most of the "shock" effect will be overcome. Do not try to hold *constant* altitude, as doing so increases the gust load. The aircraft may gain or lose altitude rapidly when riding up or down drafts, but there is little danger of a down draft carrying it into the ground. Holding safe altitude should be the main concern.

Power for desired airspeed should be pre-set before entering a storm. All control movements should be made smoothly. Heavy turbulence is usually of short duration and ends as abruptly as it is encountered.

Continuous airline and Air Force operation has shown that all-weather flying is feasible. Turbulence remains a problem but continuing studies have unseated it as the hazard it once was. END

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MORE TACAN—VOR/DME

The Air Coordinating Committee's compromise plan to continue VOR (omni) and DME (distance measuring equipment) as the Federal airways' basic Common System radio navigation aids until a better system comes along (AOPA NEWS, July, 1955), did not end the argument about VOR/DME and the military-sponsored TACAN (tactical air navigation) systems—raging for months in Washington between and within civil aviation groups, Government agencies, and even Congress.

New and continuing discords were reflected by an Air Transport Association (ATA) immediate refusal to accept the ACC compromise, by renewed military attempts to get at VOR/DME through the CAA budget, and by widely different reports submitted by two House of Representatives committees after investigating the TACAN controversy independently.

● The House Committee on Interstate and Foreign Commerce conducted the first Congressional TACAN investigation. The committee was headed by Rep. Oren Harris (D-Ark.). The investigation was largely directed by Rep. Carl Hinshaw (R-Calif.) who formerly enjoyed the reputation of being civil aviation's Capitol Hill champion. The committee reported general concurrence with the ACC compromise, scolded Government agencies for overlapping and duplicating efforts in Common System development, recommended that DME be limited after 1958, gave the "go-ahead" to TACAN development, and urged TACAN declassification. AOPA labeled this committee's report as "a whitewash of TACAN."

● The House Government Operations Committee's Subcommittee on Military Operations conducted the second TACAN inquiry. This group was headed by Rep. Chet Holifield (D-Calif.). After hearing from triple the number of witnesses heard by the Harris-Hinshaw committee (many witnesses appeared before both groups), the Holifield subcommittee evolved an entirely different, sharply disagreeing report which termed TACAN "an example of the military going into full-scale production on a procurement before the item is reliable." The report recommended:

1. Congress should make a joint (House-Senate) investigation of VOR-/DME-TACAN navigation systems and determine their relative merits as the Common System base,

2. TACAN deliveries should be limited to needs for technical development,

3. The President should review the Air Navigation Development Board (ANDB), ACC, CAA, and military department functions concerned with the Common System toward possible reorganization for more efficiency,

4. The General Accounting Office and the Bureau of the Budget should find out exactly how much ultimate TACAN cost will be,

5. Secrecy wraps should come off TACAN immediately, and

6. The Department of Defense should show cause to Congress why TACAN should not be readvertised to allow greater competition in TACAN manufacture with resulting lower costs.

Commenting on the divergent committee opinions, AOPA assistant general manager, Max Karant—who has spearheaded civil aviation's fight for fairness in the TACAN argument—said:

"The Military Operation Subcommittee's report on the VOR/DME-TACAN issue is, in AOPA's opinion, an excellent example of the kind of perceptive analysis that can be done by a group of public officials seriously concerned with the public welfare.

"While other Congressional reports dealing with the controversy have gone into the matter in some detail, the report of this subcommittee makes it clear that it worked hard to get the facts, analyze them, and reach carefully-considered conclusions based solely on those facts. This is all the more commendable because of the highly technical nature of the subject and the amount of misleading information put out by TACAN proponents.

"AOPA concurs with the subcommittee's recommendations. The way the military has threatened the Common System with TACAN demands scrutiny. AOPA agrees that a joint Congressional investigation and a thorough General Accounting Office study of TACAN should be made.

AOPA agrees that an organization to guide the Common System must be determined. AOPA believes that the Radio Technical Commission for Aeronautics (RTCA) is the proper organization, since RTCA devised the Common System and obtained all users'—including the military's—agreements to abide by it. AOPA believes RTCA should continue, and that all non-military users of the airways should be protected from secret, conflicting injurious actions like TACAN taken outside the agreement body.

"Congressman Chet Holifield (D-Calif.), subcommittee chairman, committee members, and the staff deserve commendation for the way they performed this public service."

Additionally, the AOPA Confidential Newsletter, June, 1955, observed: "The primary TACAN contractor—Federal Telecommunications Laboratories, division of International Telephone and Telegraph Corp.—is running an advertising and publicity campaign trying to overcome unfavorable TACAN publicity focused by the controversy. The widely-published advertisement claims TACAN 'will revolutionize aircraft navigation,' and makes other broad claims—including a statement that TACAN can do the whole job in space the size of an ordinary 'shoe kit'. Recent TACAN publicity includes photographs of such a box, presumably for small aircraft. AOPA inspected the box some time ago; it's a dummy. No such working unit exists to AOPA's knowledge."

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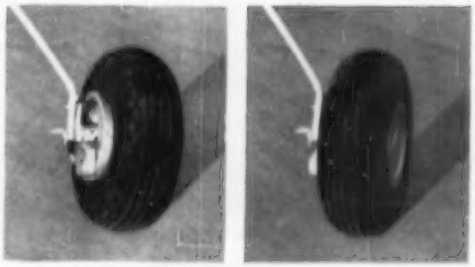

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Helio Courier

(Continued from page 29)

is similar in design to the old Gull-wing Stinson. It has a 14 inch oleo travel plus a built-in flex of another nine inches. A shear point has been designed 14 inches below the fuselage so that the rugged gear will break off and leave a protective stub at this point rather than buckle the fuselage if it hits an insurmountable obstruction.

"We've sacrificed the weight of one passenger to build safety into this airplane," explained Bollinger as we climbed aboard. "Following the advice of Mr. Hugh DeHaven, former Director of Cornell Crash Injury Research, we are using a steel-tube framework around the passenger compartment, and all seats are stressed for 15 g's with safety harnesses that hook across the hips and one shoulder. Add the extra weight of wing slots —a definite safety feature—plus the unusually sturdy landing gear and we've put an extra 150 pounds into the airplane. This has required building a five-place size airplane to carry four occupants with the added protection."

Cockpit appointments are relatively standard. The airplane has good forward visibility for a plane equipped with a conventional landing gear. Since the gear is mounted much farther forward than on most planes, there is considerable weight on the tail wheel and above normal power must be applied when making turns on the ground.

The fuel system consists of two 30-gallon wing tanks with a single on-off selector. Safety research specialists felt there was best inherent safety in this arrangement. Mr. Bollinger commented that he personally would prefer two tanks with a selector, and I agree, but the researchers have some rather convincing statistics to back up their single-source fuel philosophy.

After a routine run-up, I pointed the *Courier* down the short El Monte runway. Take-off is easy. Roll down full flaps with the big hand crank on the roof between the two front seats—the trim tab is the smaller handle on the same fitting—and open the throttle. Push the control column all the way forward and as soon as the tail begins to come off the ground, you're ready to fly. It seemed more than weird to haul back on the control column before the airspeed hit 40 mph, but you can do it in the Helio and go upstairs in a hurry. The Goodyear crosswind gear installed on N242B—at extra cost—takes care of any unusual crosswind.

It's the angle of climb rather than the rate that is so spectacular in the Helio. It will clear a 50-foot obstacle with a full load in 165 yards and we were at pattern altitude before we crossed the boundary of the small airport.

During climb-out, I had a chance to check the control forces which were very comfortable. Rate of roll is rapid for an airplane as large as the *Courier*. Only in slow flight does the plane respond differently from other aircraft, and that is merely because it goes so much slower than most. After climbing to 3,000 feet, we leveled off and tried some slow flight. The eyebrow slots popped forward—with considerable authority—at about 50 mph. It would take a couple of hours in the Helio to become accustomed to the "bang" that occurs when these air-loaded slots pop open, but there is no need to fear structural failure since the Helio will fly with one open and the other closed.

For best slow speed flight, the flaps are cranked all the way down. There is no appreciable load on the bell-crank to the flaps until they reach the midpoint. Then the airplane must be slowed to about 65 mph to permit the flaps to come the rest of the way down without effort.

When the plane finally slowed to 40 mph—and should have quit flying long ago by conventional standards—the Helio president suggested that we put our feet on the floor and try some steep turns.

A moment later he said, "No, much steeper than that. Let me show you."

With just over 30 mph reading on the airspeed needle, Bollinger racked the Helio into a near vertical bank and rolled it level with the ailerons alone. Instinctively, I hung on, waiting for the plane to spin out. The "interceptor" spoiler just behind the wing-tip slot did the trick and put the airplane on an even keel.

Mr. Bollinger explained that the Helio wing can be brought to the point of a technical "stall," which is defined as the angle of attack providing maximum lift, but that it still maintains controlled level flight with power on at speeds way below the theoretical stall point. If the wheel is

KING SIZE SNORTER

Ever wonder what has happened to the short-snorters? This one measures 37 feet. Its owner, George Stone, has to drape it lei-like around his neck when showing it as here to New Jersey's Governor Robert Meyner.

Started in September, 1942, Stone's snorter was in his pocket on Africa's D-Day, has been to South America, Europe and Asia. Among its famous signatures are those of Generals Douglas MacArthur, "Teddy" Roosevelt, Jr., and Mark Clark; Bob Considine, Phil Cochrane, Bob Hope and Rita Hayworth. The owner's greatest pride is in the hundreds of pilots who adorn his king size treasure.

held back, power-off, the *Courier* settles with a forward motion at about the speed of a parachute in a brisk wind, but at no point does the wing lose its lift and control. Similarly, the *Courier* can be flown into a low speed rotation, which is in effect a controlled spin, but must be held there forcibly by the pilot and can be straightened out without the customary dive recovery. Regardless of control abuse, it will not fall into the uncontrolled condition that the experienced pilot has in mind when he asks, "will it spin?"

One of the results of this unusual design is safe slow-and-low flight. Particularly in areas of bad weather, the Helio can be flown at minimum altitude and still have control to turn on a dime, should an obstruction loom out of the murk. In this manner, Bollinger explained, he has been flying safely "under" rather than "in" the bad weather encountered on his tour.

While Southern California does not have the convenient section lines to stopwatch air speed, Mr. Bollinger affirms that in acceptance tests the *Couriers* have been checking out between 138 and 142 at sea level on 75 per cent power, with an optimum cruise of 157 at 8,500 feet.

When it came time to put the slow landing characteristics of the Helio to work, we went into nearby Rosemead Airport where Fletcher Aviation builds another slow flying airplane, their agricultural utility, the FU-24. The Helio slowed down easily in the pattern with reduced power and a few turns on both the trim tab and flap control.

"Trim it out for an 80 mph glide, flaps up, and leave the trim tab alone after that," counseled Bollinger. "If you come in with full flaps and power all the way off, I'll bet you bounce the first time."

He was right—and I did. Later he explained that it takes a little power to offset the high drag with the big flaps fully extended, if the pilot wants to make a normal flare-out starting at the usual 30 to 40 foot altitude. With half-flaps power-off, it lands normally, much like a *Super Cub*.

The soft landing gear cushions any shocks that tend to develop when the 3,000 pound airplane is dropped—as I did the first time. However, after a couple of take-offs and landings, you begin to get the feel of standing this big airplane on its tail for take-off just as soon as you're rolling. On 30 mph full-flap landings, a touch of power applied during flare-out puts the Helio down in a three-point attitude—so slow, you could get out and walk alongside. A soft application of brakes after touchdown and you can stop in three or four lengths of the airplane.

The Helio *Courier* is truly one of the most unusual airplanes now in production. It represents seven years of design and development work and over a million and a quarter dollars of investment, not counting labor put in by engineers, just for love of the project.

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For reservations write, wire or phone E. V. Fryhoff, Skyhaven, Warrensburg, Mo.

I Was a Night Bomber

(Continued from page 37)

night we limited our flight to two hours. Few of the targets were more than 30 miles over the line, and none were over 50. Adding to the time it took to gain altitude, we were good for raids of 75 miles from our starting point. That was about the distance to the Zeppelin hangars at Gontrode, Belgium, which we bombed twice before Intelligence advised us that no Zeppelins had been berthed there for months. "So stop wasting bombs!"

Our target was usually a rail junction or some small town along a railway line. The official theory was that enormous supplies of ammunition and food were continually en route to the front on the railroads of Belgium and France, so the most useful job for night bombers was to destroy this stuff and thus starve the enemy infantry.

It was a nice reasonable theory, and at the time I went along with it, for we did occasionally hit goods wagons (freight cars). But although some of us did observe fires along rail lines after dropping our bombs, nobody could say with any certainty just what was burning—maybe an empty freight car or a nearby shack; or some unlucky Belgian's home. No-

body waited around long enough for a really good fire to get going. I figured my bombs had hit the ground and destroyed something, even if it was only cow pasture. So I was content that I had done my duty, without loitering in the vicinity to pick up details—and quite possibly a shell that would be the end of me—and the PBO as well; though I can't say that his safety ever was much on my mind. Let him do his own worrying.

I understand that modern bomber crews welcome bad weather, especially at night, for it aids their concealment and permits them to use evasive tactics when attacked—they hope. Back in 1917 and 1918 we also welcomed bad weather! In bad weather we didn't fly!

We not only didn't fly in bad weather; we didn't fly in anything but the best weather, with at least some moonlight. On black nights we didn't go up, since we couldn't find any targets in the dark. And on rainy or foggy or snowy moonlight nights, we didn't fly because the authorities knew we'd get lost, fail to find our target, and land all over France if we got back. We had on two occasions run out of gas without first finding our aerodrome—a tactical error of the first magnitude. One character, upon occasion when the area suddenly fogged in, landed safely near his field and, thinking he was behind the enemy lines, set fire to his FE by shooting incendiary bullets into his gas tank. Imagine his mortification!

This couldn't happen in SAC. Modern flying technique doesn't allow such latitude for rugged individuality in the air. Flying was far less accurate and much more interesting and amusing in the old days than it is today.

We knew nothing more about navigation than the bare facts visible on our dimly illuminated compasses, which were accurate within ten or twenty degrees. We knew east from west and north from south; and there was always the front line with its Very lights and star shells and bursts of artillery fire. It was never quiet on the Western Front. At night the line lay like a slash of spluttering light across the French and Belgian countryside, from north to south.

We found our way to and from our targets by visual observation of canals, rail lines, roads, towns and even irregularly shaped patches of wood. We got to know Nieppe Wood and Clamairie Wood and Dickiebusch Lake, and the skeleton remains of Ypres, with the walls eerily standing in lines like rows of tombstones in the moonlight.

On our side of the front, we had flashing gas beacons set near towns and villages. Their dot and dash flashes told us where we were—if we could see them. Northern France has some of the world's worst weather in winter, and we had a weather reporting service that for sheer inefficiency couldn't be matched. So despite our caution, many a flight that had started off in bright moonlight ended in rain or snow. In spite of ourselves, we eventually became pretty good bad weather pilots.

When nearing our targets, we were supposed to glide down to 1,000 or even

(Continued on page 68)

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(Continued from page 67)

as low as 500 feet to make sure of hitting the objective. Certainly, from much higher than that we could be sure of hitting nothing but the ground, for our bombsights not only were highly inaccurate for daytime use but at night the observer couldn't even see through them. Actually the observer ignored the bombsight, peered over the front of his cockpit, and pulled the toggles when he figured he was coming up on the target. To give him his due, he usually was on the right line but usually either short or over.

At the beginning of their tour as night bombing pilots and observers, a majority of the air crews came down low—500 feet or even less. Clearly outlined in the moonlight and sometimes caught in a searchlight beam, the slow-flying FE made an ideal target for machine gunners on the ground. They should have been able to bring it down. True, the planes came back from raid after raid peppered with holes from end to end. But to bring the craft down, it was necessary to hit a vital part—the engine, the gas tank or the pilot. Even killing the observer wouldn't knock the noble FE from its course. I brought my first observer back with a bullet in his leg. He said good-bye and, with tears in his eyes, thanked me for getting him out of the war. You'd have thought I had personally arranged for that bullet to hit him.

As I had been a duck hunter from boyhood in my native Nova Scotia, it was no puzzle to me that so few machine gunners knocked us down. They were quite obviously firing at the plane, as they would at a stationary target, not having been taught that they should lead it and let the bird fly into the shots. Still, we got enough hits to worry us and, after the first few raids, the smart pilots were coming home almost undamaged—evidence that the boys were not dropping down so low any more.

Once I got a bullet through my little wicker pilot seat. It went on through a fold of my leather flying coat. The flight sergeant pointed it out to us next morning. "What would I have done if you had been killed?" my observer wailed indignantly. He wasn't worrying about me. But I was. I went to St. Omer and scrounged a big cast iron stove lid. The storekeeper tried to sell me the stove as well but I got away with the lid, which I sat on for my remaining months as a bombing pilot. I may have had the first armor plated bomber in the RFC, for all I know. It was a basically sound idea,

AVIATION ALPHABET NO. 2

To keep you posted, here are the alphabet designations for aviation's associations, organizations, government departments, and committees.

AAAE ... American Association of Airport Executives
ACC .... Air Coordinating Committee
AIA ..... Aircraft Industries Association
ALPA ... Air Line Pilots Association
AMA .... Aero Medical Association
AMIS ... Aircraft Movement Information Section, CAA
ANDB ... Air Navigation Development Board
AOC .... Airport Operators Council
AOPA ... Aircraft Owners and Pilots Association
ASDO ... Aviation Safety District Office
ATA .... Air Transport Association of America
ATEF ... Air Traffic Evaluation Facility, CAA
ATS ..... Aeronautical Training Society
AFA .... Air Force Association
ASME ... American Society of Mechanical Engineers
AWA .... Aviation Writers Association
CAA .... Civil Aeronautics Administration
CAB .... Civil Aeronautics Board
CAP .... Civil Air Patrol
DAE .... District Airport Engineer, CAA
DAMI ... Designated Aircraft Maintenance Inspector
FAAP ... Federal Aid Airport Program
GOC .... Ground Observer Corps
IATA .... International Air Transport Association
ICAO .. International Civil Aviation Organization
IFO ..... International Field Office, CAA
NAA .... National Aeronautic Association
NACA ... National Advisory Committee for Aeronautics
NASAO .. National Association of State Aviation Officials
NATA ... National Aviation Trades Association
NATC ... National Air Taxi Conference
NBAA ... National Business Aircraft Association
NFFA ... National Flying Farmers Association
SAE ..... Society of Automotive Engineers
SSA ..... Soaring Society of America

though at the time I felt rather ashamed for being so timid and warned the sergeant not to breathe a word of it. But there are no secrets in a combat squadron, so word got about. In no time the FE's were staggering off the ground with an assortment of stovelids, boiler plate and other protective hardware that should have insured the crews' survival but that added to the risk that the FE wouldn't get into the air before it ran out of flying field. One did crash on a take-off but the commanding officer never learned that the wrecked FE carried two stove lids for the crew and a 150 lb. slab of quarter-inch boiler plate under the engine. That pilot was weak on his aerodynamics.

We should have been sitting ducks for artillery and 20 mm. incendiary shells fired from pom-poms. These things, called flaming onions, were rather terrifying as they streamed up toward you and whizzed by like green rockets. It seemed that they shouldn't miss but most of them did. Unless you happened to get caught in the beams of two searchlights, there was nothing to worry about. In that event, the pilot made steep reverse turns to lose the lights, or just put the nose down and high-tailed it away from there as fast as the clanking Beardmore could drive him. The observer, meanwhile, would be firing down the searchlight beams, trying to put out the light—a forlorn hope, as the glare blinded him. Our machine guns were used for that purpose and to spray the ground around targets to discourage enemy machine gunners.

Our guns also were intended for protection against enemy night fighters, none of which appeared before I left 102 Squadron in July, 1918. I had flown ten months over enemy territory without having a single shot fired at me from another aircraft—an experience that SAC bomber pilots will never have.

Outside of our own planes, which carried navigation lights on our side of the lines, I saw only one other plane in the air at night—a German *Gotha* headed west while I was going east to bomb his territory. It was bright moonlight and we had approached each other almost head on before either of us realized the other's presence. He went by at less than a hundred feet. He and his observer waved. My observer and I waved. It was minutes later when my observer kneeled up in his seat and shouted, "I should have shot at him!"

I grinned and shouted back, "There are enough people on the ground shooting at both of us. Don't be so darn belligerent." After we landed, we talked the incident over and he agreed with me that bombers shouldn't shoot at bombers. It was too much like ducks shooting ducks.

I hadn't realized, even by the end of the first World War, that chivalry can have no place in modern warfare, and that the nature of the weapons dictates the ethics of the fighting man. The soldier using the weapon has no choice in his use of it.

That much, and about that much only, we bombers of yesteryear share with the bomb crews of today. END

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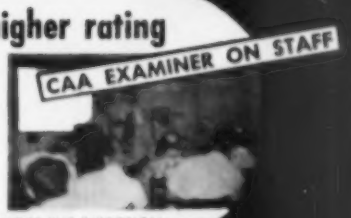

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I Learned About Flying from That!

(Continued from page 48)

to the surface. For the first time I realized that the plane was on its back with just a few inches of hull sticking up. Humphreys also bobbed up, quite calm and none the worse for wear.

What happened was that the wheels were not retracted far enough to fold and, as they dragged through the crest of a wave, they created enough resistance to put the nose squarely into the base of the next towering sea.

The impact of an airplane flying into a solid wall of water is terrific. Some of the heaviest rivets were knocked loose from the hull. All of the glass went; one wing was badly buckled, and the tail surfaces were knocked off. Despite this, neither Humphrey nor I had any sense of a severe impact; neither of us received a single scratch or had an ache or a pain the next day.

The reason for this was that, on the day I bought the *Seabee*, I had installed a heavy set of shoulder harness which were fastened by cable to one of the principal members of the frame. What happened proved to me the complete accuracy of the tests made at Cornell. If one can keep from plowing head-on into something solid, and keep an airplane flying until the moment of impact, it is very difficult to get killed or seriously hurt, providing the concentration factors produced by the crash can be avoided. It is not deceleration that produces death and serious injury. It is the impact of head or chest being banged against some small object that concentrates the forces of the impact into a small area. This is demonstrated in shooting. When a man, let us say, shoots an elephant, the man who fires the rifle receives just as much of the impact as the elephant which receives the bullet. The only difference is in the concentration factor.

We are all going to make mistakes in flying and get into situations that may produce unexpected difficulties. Whatever the cause of the crash, no harm is done until the plane hits something. That is the last event of the sequence. When it is so easy to have a simple, inexpensive device which will forgive almost everything that has gone before, it strikes me as unnecessarily risky not to have it.

I've believed this for a long time and have never owned an airplane without shoulder straps. As long as an airplane is used as a means of transportation and is going to be flown at night, over water, or in limited instrument weather, there is, of course, some danger but they are hazards which must be calculated and assumed. There is no need for anyone to assume the ultimate risk of a fatal accident when it can be minimized so easily and inexpensively.

I've taken a lot of ribbing from my friends about this incident. Many of these critics won't fly across water, at night, or on instrument, and make quite a point of being "safe" pilots. Some of them have fine and expensive airplanes, but none have shoulder harness. I don't think anyone can justly claim to be a careful pilot without it. END

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Green Pastures Again

(Continued from page 43)

Refueling is a ticklish job while the plane's engine "stays lit."

"That's simple economics," Marvin explained. "At the price we charge for seeding, time is our most valuable commodity. A hot engine is often difficult to start again, and hours can be wasted."

Marvin graduated from Texas A and M only two years ago. While there, he flew the college's experimental spraying and seeding planes. Building upon A and M's research, young Gardner and his brother went about the job of selling aerial seeding to Southwest ranchers.

"We realized that results alone counted with the ranchers," Marvin related. "That posed two problems—first, selection of a sure-fire grass seed; second, putting down a good spread."

Buffel grass, well known to rangemen, was the Gardner brothers' first choice; and it so remains, although they occasionally spread Blue Panicum when conditions warrant and ranchmen so prefer.

Buffel grass seed is insulated in a burr that protects it from mice, birds and bugs until such time as soaking rains come to wash it into the soil and give it opportunity to germinate. Besides being drouth resistant, buffel will grow well on blow sand or on heavy soil without fertilization. Moreover, the seed can wait as much as six months to a year for rain, without damage. One characteristic of buffel grass seed, however, almost whipped aerial seeding efforts in the initial stages. That is its hairy, fluffy characteristic. Early experiments were dismal failures due to the difficulty of making the fluffy buffel seed flow smoothly and evenly out of the funnel-shaped spreader underneath the plane. Another problem was to make the seed spread evenly on the ground over a swath wide enough to keep cost down.

The first problem was solved by the Gardners themselves. They developed a unique shaft with iron fingers, fitted into the bottom of the seed hopper, and powered by a small propeller or windmill on the lower wing's leading edge. As the shaft turns, the iron fingers mounted perpendicular to it feed the seed smoothly to the spreader. This is open at the front end to admit a rush of air, and fans out at the rear to spread the seed as widely as possible. The second problem was taken care of by the downwash of air from the lower wing as it picked up the seed emerging from the spreader and flung it far and wide. The Gardner brothers guaranteed a seeding swath at least 200 feet wide.

The mechanics of aerial seeding are not unlike dusting, save that seed can be spread from a somewhat higher altitude. Preliminary to an operation, the pilot makes an elaborate survey of the terrain. Generally a base line is decided on, usually one side of the field to be worked. At either end of the field, a flagman carrying a white seed bag on a light pole marches in-field approximately 100 feet. The pilot maneuvers into position so that, as the plane approaches one end of the field, it will pass directly over the first flagman and line up with the flagman at the opposite end of the field. Immediately the plane passes, both flagmen pace off 70 steps still farther in-field. Spacing their stops about 200 feet apart thus, the flagmen steer the plane with fair accuracy in paths that enable it to drop consecutive 200-foot wide swaths of seed. In unusually long fields, it is customary to spot an additional flagman midway of the two end-men—as a further aid to keeping the pilot "on course" and assuring good coverage.

Flagmen, Marvin said, must be impressed with the need to keep the flag waving back and forth—since a stationary flag, even a clean, white one, blends into the background of sun-parched earth. Where advance survey indicates hummocks rising 50 or 100 feet higher than the average level, the Gardners adjust altitude to clear the highest point by 100 feet. Flying too low tends to narrow the seed swath. Wind is a powerful factor, even a small amount of wind, since the fluffy buffel grass seed has almost no weight. Whenever wind is present, the most meticulous calculations must be made as to direction and velocity, if the seed is going to land where desired.

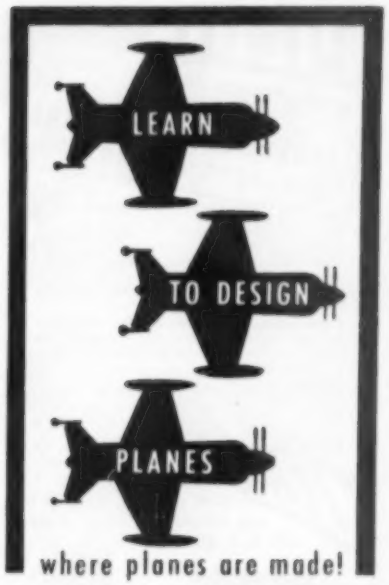
Although the boys must refuel "hot", refuelling, even for some vast acreages, is not a serious problem; the Stearman carries three and a half hours of gas, and at slightly more than 100 mph, that's a lot of acres. The main burr under the saddle is refilling of the seed hopper which carries only 50 pounds of seed.

The customary rate of speed is one-quarter pound of seed per acre, although as much as a full pound per acre has occasionally been put down in response to unusual range conditions. This means the Stearman can carry enough seed for 200 acres of land. A mile-long strip 200 feet wide will contain 25 acres; and by simple arithmetic, a seeder pilot can make eight passes across a mile-long pasture before he runs out of seed.

An odd facet of aerial seeding is the fact that it is almost impossible to observe the seed falling from the plane. Until lately the pilot's only check on whether seed actually was falling was to fly over a small tank, as Texans call range ponds, and study the distribution of the seed on the surface of the water. Quite by accident, the Gardners learned that, through the use of red goggles, they could actually see the buffel seed as it fans out in the wake of the plane.

It was mid-afternoon when the boys finished their runs, and together we headed back to Crystal City, Lew Moore riding with me in the Luscombe. I glanced again at the yellow and burned rangeland spreading around us. And it occurred to me that, after several years of grass growth, the clumsy old planes will have a pretty warm spot in the hearts of the ranchers.

Seeding already accomplished on thousands of acres has paid off, with the buffel sowed from the air almost doubling the area of its original germination. If something like normal rainfall returns to the Southwest, the tragic dust storms of past summers will be pages in best-forgotten history. END



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Any Ice Today?

(Continued from page 47)

full-rich position. How can the average pilot analyze this condition? Is there any harm in using the mixture control at altitudes below 5,000 feet?

The answer is that an excessively lean mixture *can* damage an engine, because a too-lean mixture will raise the combustion temperature, burn the valves and (in high-power engines) cause detonation and possibly damage the cylinder heads. But by using the following method, a pilot can analyze mixture troubles safely, even without head-temperature or fuel-air-ratio gauges.

A reliable method, which has never burned a valve, is to get set at cruising power at any desired altitude, but preferably at a safe altitude. Now lean out the mixture slowly, watching the tachometer; if a slight movement of the mixture control lever causes a rise in rpm's and a smoother engine, the mixture was definitely too rich. This, however, normally occurs at higher altitudes, such as 10,000 feet, rather than in an isolated instance such as Pilot A's.

Whether or not the mixture was too rich, continue to lean it out until a drop in rpm's is observed. This setting is *too lean*, and the mixture must be richened until the rpm's return to the previous given setting. This method will not burn valves even at altitudes below 5,000 feet, where just a small motion of the lever should cause the results just described. As far as Pilot A was concerned, he did have a rich mixture at a fairly low altitude and the corrective measures used were appropriate.

It should be mentioned that roughness in the engine caused by rich mixture at higher altitudes is not always accompanied by a drop in rpm's, and conversely to move the mixture slightly from full-rich position does not always provide an immediate increase in rpm's. Ordinarily, however, the rpm's should increase and greater smoothness result when the mixture is first adjusted above 5,000 feet; and finally, as the mixture control is moved toward "lean", the correct setting of the mixture control may be found by the method described above.

Pilot B, on the other hand, had a different problem. He was flying fairly low horsepower, from which only a relatively small amount of heat is available in the first place; and which is very allergic to water. As he flew into conditions favorable for icing, his engine ran rough suddenly, which caused him to conclude that it was ice, not altitude, that resulted in a rich mixture and rough operation. But if he had sudden ice, there was plenty of it and it was forming fast! To use full mixture continuously would melt the ice, form water, and drown the engine. On the other hand, with an engine of low power, producing little exhaust-manifold heat for the carburetor, he had to take immediate action because, as the ice decreased the carburetor air, and thereby richened the mixture, manifold heat was also reduced; soon the situation could become hazardous.

There was only one thing to do: apply full heat momentarily. Half heat, in a low-horsepower engine, is often as futile as none at all, while continuous full heat would melt the ice too fast. Pilot B melted his carburetor ice a little at a time by using full heat intermittently; then, by watching his tachometer for a slight rise in rpm's, and listening to or feeling his engine, he could tell when the ice was melted. (With an iced carburetor venturi, application of carburetor heat will usually melt the ice, lean the mixture, restore smoothness, and increase rpm's slightly; removal of heat should restore rpm's to normal. With a clear carburetor, application of heat will lower the rpm's, because hot air is less dense than cold air and a richer mixture results).

If this is so, what should a pilot do next? Use heat? If so, how much? What damage may result from use of full heat? The answer is that damage from excess carburetor heat in lightplanes is not likely; but poor efficiency and higher fuel consumption is probable. The best procedure is to use Step 1: apply carburetor heat, followed by Step 2: use of the mixture control; and to use these steps in conjunction with flight instruments.

But, if we do not have a full instrument panel, what are the most important instruments in a basic panel for contact flight in icing conditions? As far as carburetor ice is concerned, they are the

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tachometer and the airspeed indicator. A good pilot knows his airplane, and he should know what indicated cruising speed results from a given power setting at a given altitude. Suppose he is cruising at a certain altitude and notices a subnormal airspeed. The rpm's have fallen off, so he incorrectly assumes a creeping throttle and adds power, but he still does not regain normal airspeed. The reason for this is that normal power is not being developed because of (a) carburetor ice and a rich mixture or (b) high altitude with no mixture control and a rich mixture, or (c) combination of both. Normal power depends upon rpm's and manifold pressure, and had he possessed a manifold pressure gauge he would have observed that, as ice formed, the manifold pressure decreased. By applying heat and obtaining a leaner mixture, both the pressure and rpm's would increase, and the airspeed would return to normal. And, if the throttle had been advanced in error previously, he would now have to reduce power to obtain his given airspeed.

Again, if there were no ice in the carburetor, a reduction of airspeed could be caused by a decrease in rpm and a slight decrease in manifold pressure, resulting from a rich mixture. As this indication is the same as that from ice, we still must go back to Step 1 followed by Step 2 to solve the problem. When Step 2 is applied, the rpm's will increase, the manifold pressure will increase, the engine should smooth out, and the airspeed will return to normal.

For those who are so fortunate as to have additional instruments, the problem is easier and the same principles apply. With a constant-speed propeller, the rpm's, oddly enough, will drop off when the mixture is leaned out to maximum lean and the manifold pressure will rise slightly. The best setting will be found when the mixture is richened enough to return the rpm's and manifold pressure to normal. Some pilots prefer to use the senses of feel and hearing in adjusting the mixture to obtain the setting that yields the smoothest engine operation, but this requires keen sensitivity and it does not always result in maximum efficiency or minimum fuel consumption.

If a carburetor temperature gauge is available, a continuous carburetor heat indication of slightly higher than freezing will prevent the formation of ice; however, if ice is not being formed and as this procedure is inevitably accompanied by increased fuel consumption, it does not seem advisable to use heat when it is obviously not needed. For the lightplane pilot who does not have a carburetor temperature gauge, the best procedure is to note the carburetor heat control setting, increase the setting to see if this melts any suspected ice, and to return the control to the previous setting if no ice was melted, as indicated by the airspeed and tachometer readings.

What simple rule could be formulated from the foregoing? Simply this: if in doubt, use heat properly and study the gauges; they tell an interesting story. But you can't do either most effectively unless you know your plane. END

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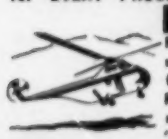

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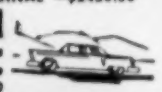

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Hurricane Watch

(Continued from page 31)

westward, it passed over the island of Grenada. This small, tropical isle was the first to feel Hazel's wrath, but was prepared, thanks to Squadron Four. Hazel was still in her teens when she crossed Grenada. Winds had only recently reached hurricane force, and rain was only a mild forecast of her mature future.

Moodily the storm drifted across the Caribbean. Deep in southern waters, she crawled in a slow wavy pattern toward the west northwest. Four times Navy Hurricane Hunters penetrated to the eye of the ominous hurricane. Each time the reports about Hazel were similar. Her west side lacked the towering clouds, heavy rains, and extreme turbulence which weather crews associate with a full hurricane. Maybe Hazel would prove a pushover.

Then to the east of the eye the clouds began to tower and the confused wind gusts picked up. A flying aerologist analyzed the situation and decided to guide the plane into the threatening eastern half of the storm. He got the surprise of his life. "Wind 120 knots," he radioed back to Miami.

Hazel had a dual personality. Approached from the west, she was a mild, poorly-developed tropical storm, but to the east she was a full-blown, howling hurricane. High above the western side, meteorologists reasoned, a pronounced low pressure trough kept the west side tame, while to the east, the storm grew.

Early in the morning of October eighth, a Hurricane Hunter crew flew toward the supposedly weak west side of the storm. While still hundreds of miles away, the plane's radar indicated that Hazel had escaped from her western tamer and blown her top. The hurricane had become mature on all sides. Long bands of awesome clouds spiraled counter-clockwise on the radar scope toward the center. Carefully the plane threaded a path to the eye of the storm. The crew relaxed as they circled slowly in the eye. The radioman sent out the new storm position.

Now to get out and head for home. The big plane steadied on a southwesterly course. At 300 feet altitude it started out into the weakest sector. The ship began to buck and vibrate. "Wind 80 knots—90—100 knots," the aerologist tolled off to the navigator. Abruptly, his voice stopped. A huge updraft flung the ship suddenly a thousand feet upward. When the craft suddenly stopped rising, everything in it continued the fantastic ascent. Equipment and personnel bounced off the overhead and thudded to the deck. "Camera port shattered, hole smashed in the deck, two men unconscious," the intercom relayed to the pilot.

Hurriedly, the skipper threaded his way outward and limped for Cuba. The radioman alerted medical facilities. One man revived. The other, with his shoulder seriously injured, writhed on the deck as his crew mates administered first aid. Hazel had claimed her first victim.

Another Hunter flew to the storm. But now the word was out. Hazel was vicious and not to be trusted. The plane cruised around the outskirts of the storm far from the center. Here, with its radar probing the eye, it sent regular reports to an alert group of Air Force, Navy, and Weather bureau meteorologists.

West northwest Hazel traveled, on a course well to the south of Haiti and Cuba. The island residents relaxed as the storm was apparently headed safely south of them. A detachment of the Hurricane Squadron based at Guantanamo, Cuba, kept constant watch on Hazel as she grew larger each day. For five days she followed the same path, but on the tenth of October, veered like a tempera-

"I have something here I thought might interest you."

mental shrew. On the twelfth of October a Navy reconnaissance plane reported the storm as surely bearing down upon Haiti. Then true to prediction huge waves, high winds, and torrential rain began to pile up a grotesque record of death and destruction. Small towns were devastated by its fury as flimsy tropic dwellings were knocked flat by Hazel's force.

The storm slipped off the island and sucked up a reviving swig of water from the Gulf of Gonaives. Then she thundered ashore again, this time across the northwestern tip of Haiti. The populace watched with frightened dismay as their homes were smashed and portions of their fishing fleet were flung far from the bay into the city's streets.

Hazel seemed to be testing herself; she could cross land and survive. She slid off the island heading north northeast. A few islands in the Bahamas blocked her course to the Atlantic where she might have blown herself out with harmless fury. She nibbled at the edge of Great Inagua Island and then shifted course once again. This time Hunter reports said she was heading north northeast and toward the U. S. Hazel was no lady but the trips across land tired her. Reconnaissance aircraft reported a much weaker storm than that which had first hit Haiti.

But Hazel paced herself. She swerved around the island of San Salvador and sucked up more warm water in the Bahamas. This was all she needed. Warm water replenished the energy which had been expended in Haiti. This was her fountain of youth, and Hazel was lusty again.

As the storm swept northwestward, Squadron Four began to relax. After fighting Hazel for nine continuous days, relief was in sight. The storm was approaching the "joint Navy-Air Force area." They would soon have help and, after 19 nervewracking flights, the Hurricaners were ready for a rest.

The storm was less than 300 miles from the coastline now. With a burst of speed, Hazel sped for the Carolinas. Now the long hours of tracking paid off, as residents evacuated coastal areas and low-lying sections.

The Navy's job was over now. Flying a storm over the U. S. where weather stations could keep track of it, was an unnecessary hazard. After the 21st and final reconnaissance flight, Squadron Four said an angry good-bye to Hazel. One hundred and forty-eight center fixes had been obtained on her. A dozen times "Four" had smashed through her heaviest winds and entered her eye to obtain data for analysis. Twenty-two and a half hours of every day, a Hunter plane had been searching out Hazel's secrets. Hard-working maintenance crews had kept the squadron flying.

As the storm smashed its way across the U. S. and Canada, tired men went to their beds with the knowledge that their efforts had alerted the country. The many flights had paid off, for although property damage would approach a billion dollars, hundreds, and perhaps thousands, of persons were still alive due to the warnings of Squadron Four. END

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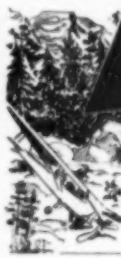

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Hangar Flying

(Continued from page 41)

informed me she had flown the Gorge on several occasions. She also told me that high voltage electrical lines run across the river in the narrows and asked me if I flew over or under them! I never even saw them.

The weather finally cleared in Billings. However, I was advised by the weather bureau to change my route and go down through Sheridan, Casper, Cheyenne and on through Omaha. Next morning in North Platte, Neb., I was informed that it was scattered at 5,000 over Omaha. I took off after filing a flight plan and chose Grand Island as an alternate. Two airports were listed there.

About 50 miles from Omaha I could see angry clouds gathering from the southeast. Lincoln was quite near but I was afraid of running into the storm. I got on the beam to Grand Island, about 70 miles from the point where I made the 180.

The Grand Island airport is the largest field I have ever landed in. It has seven runways. I was now scanning my map for information of the two fields. One was listed as an Air Force base and the other a Municipal field. I noted the Municipal field had a hard surface runway of 7,200 ft. I completely ignored the information regarding the AFB. My transmitter went on the blink in Billings, so I was unable to contact the tower at Grand Island. I could see the field 15 miles away. I selected the proper runway and began my approach. By this time the storm had moved up from the south and broke directly over me. I noted that it was the AFB I was about to land on.

Being a Sunday at 7:00 a.m. there was no activity on the field. I could not see the tower from my position but did spot some light planes in a huge hangar. I taxied to the open doors of the hangar and sat in my plane till the downpour subsided. The place seemed completely deserted and I concluded had been abandoned. I was right for once.

The storm moved on. I was anxious to check the weather and get fuel. I took off and got on a bearing that would lead me to the Municipal field I was seeking. I flew for one hour trying to locate a field that had seven, 7,200 ft. runways. (So I thought.) I had a river and a railroad track to guide me to it. Yet I couldn't find it. Finally I went back to the abandoned AFB.

When I taxied up to the hangar a second time, I observed a couple of fellows working inside. I asked where the Municipal airport was located. They told me to taxi around the building and that was it ! ! I taxied around and located the tower and CAA offices. I never will forget taking off from the very field I was looking for. However, I did clear up the mystery. There had been at one time a Municipal field. It was a grass strip 1,800 ft. long. When the Air Force abandoned the AFB, the city leased a portion of it. The map was in error on one side and correct on the other side. So was I ! !

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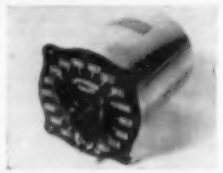
CRYSTAL  TUNING

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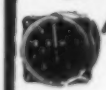

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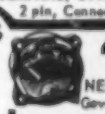

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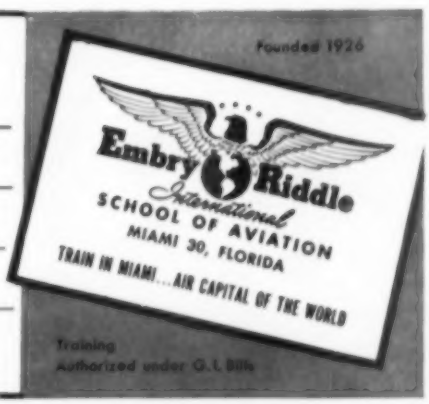

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